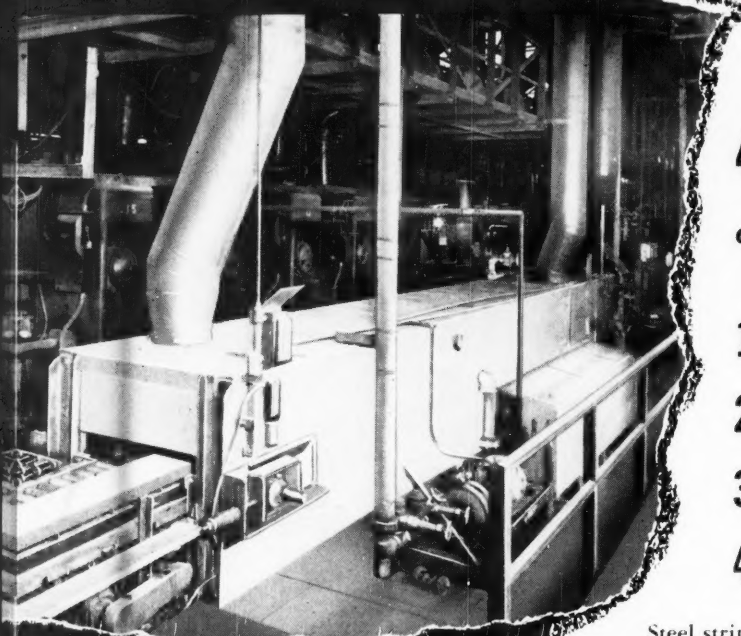
Products finishing

CLEANING
PLATING
POLISHING
FINISHING

MARCH 1950

Cincinnati

at STANDARD STEEL SPRING COMPANY



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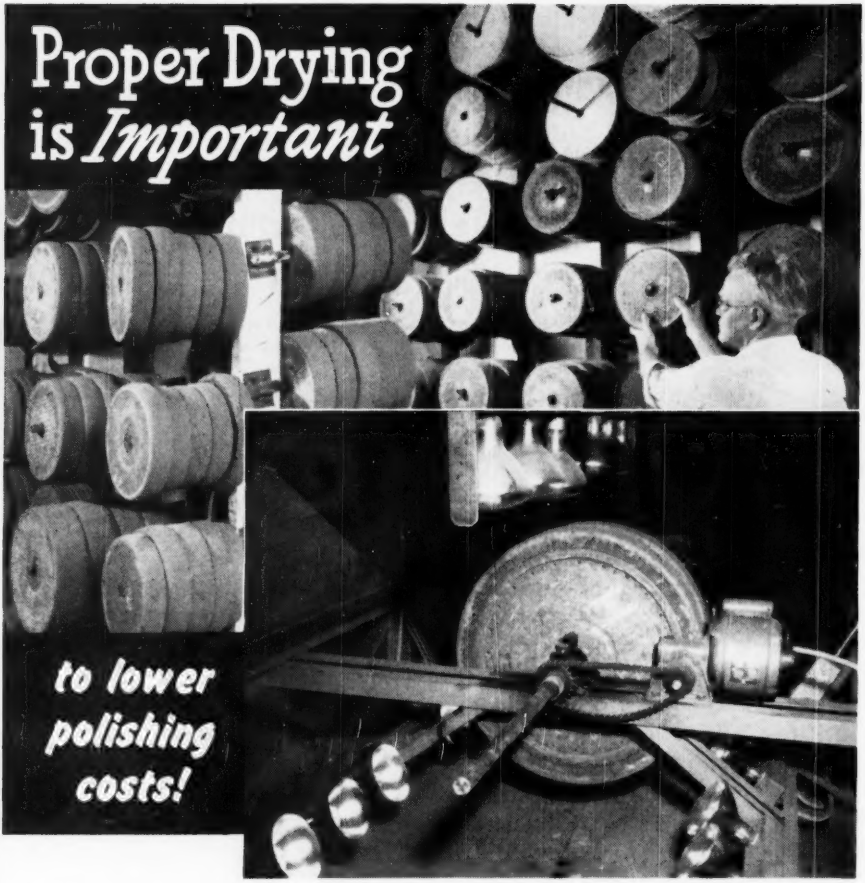

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When polishing wheels are properly dried the glue will develop its greatest possible holding strength. It will keep the abrasive grain from tearing loose and the wheel head free from glazing and spalling.

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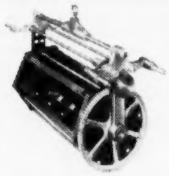
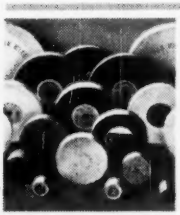


You don't have to guess what qualities make one plating barrel better than another. It must: withstand high acid and alkali solutions... endure continuous production... be unaffected by extreme temperature changes. If a plating barrel does these things, then you can load the cylinder and run it through the entire plating cycle. Result: no transfer of parts... high speed production... low handling costs. H-VW-M Mercil type plating barrels have all these qualities. Ask for Bulletin PB-107.



Guessing is out when it comes to selecting polishing wheels. Such factors as type and shape of work, and the finish desired must be considered. The wheel itself should be flexible, of uniform density and properly balanced. Be sure, too, that it is made of all new materials so necessary for maximum strength and wearing qualities as well as ability to hold the abrasive. All these factors are inherent in the full line of H-VW-M cloth, canvas, leather and felt polishing wheels. Ask for Bulletin W-102.

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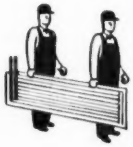
Weighs less than half as much as equivalent pipe coil. Platecoil is easy to handle. Installation can be made in ½ hour by one man and a helper.



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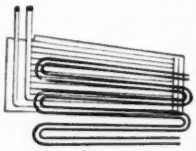
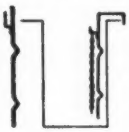


NO LOSS OF SOLUTION



Platecoil can be removed from outside of tank in a matter of minutes without dumping. All connections above liquid level.

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PLATECOIL
Division
KOLD-HOLD MFG. CO.
LANSING 4, MICHIGAN

Why Platecoils Cost Less

LOW FIRST COST

The initial cost of Platecoil is often 50% or more below the cost of equivalent pipe coil depending, of course, on the materials used in construction.

EASY INSTALLATION

By the use of "quick change hangers" Platecoil installations can be made in open tanks in one-half hour or less by one man and a helper.

NO THREADED JOINTS IN TANK

The entire Platecoil is electric welded and pressure tested. There are no joints to corrode or leak. Both connections to the Platecoil can be located above the liquid level where there is no danger of thread corroding and freezing.

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A 22" x 47" Platecoil gives the same heat transfer surface as 32 feet of 1½" pipe. This pipe requires a space approximately 30" x 60". Platecoil thus saves about 50% over equivalent pipe coil.

WEIGHS 50% LESS

Weighing only about half as much as equivalent pipe coil, Platecoil is easy to handle. A whole maintenance crew is not needed to transport and install Pipecoil.

TANK MAINTENANCE WITHOUT LOSS OF SOLUTION

There is no need for workmen to get inside the tank in order to make replacements or repairs. A Platecoil can be removed in a matter of minutes with the solution still in the tank.

LITERATURE

The new Platecoil Bulletin furnishes a complete description of the Platecoil method of tank heating. Write for your copy today.

HIGH BTU TRANSFER

More prime surface of Platecoil can be installed in a given area than can be obtained with pipe coil. Thus a more compact Platecoil unit provides much greater BTU transfer per unit area than can be obtained with pipe coil. Quick starts in heating tank solutions mean more hours of productive time.

Kold-Hold Manufacturing Company, Lansing 4, Michigan

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Products finishing

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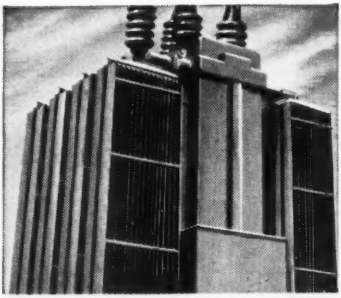
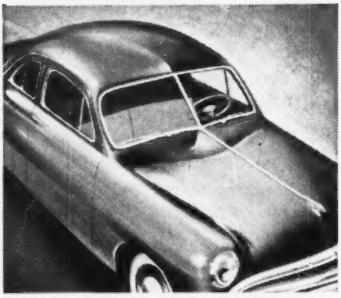


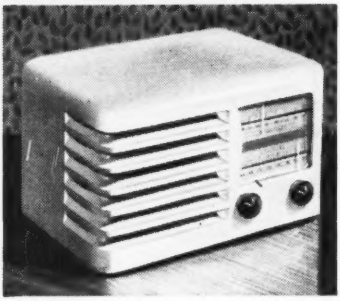
Problem: Makers of electrical transformer boxes wanted a finish that would withstand heat of molten asphalt mixture used to anchor electrical elements in place.

Solution: Industrial Finish Engineers developed a finish that not only withstood this heat, but was also durable, good looking.



Problem: To find a finish that would protect cars from weather, corrosion, and be applied quickly.

Solution: Industrial Finish Engineers were called in. Developed a finish only three-thousandths of an inch thick that resisted the elements—could be applied fast—dried fast—was durable.



Problem: To develop a colored coating to be applied to plastic articles.

Solution: Industrial Finish Engineers developed a special enamel finish. Manufacturers can now make a single run by coloring the plastic with the application of a new enamel in many colors.

Improve your sales through Engineered Industrial Finishes!

On this page are some examples of the way Industrial Finish Engineering can cut manufacturing costs and improve the selling features.

What can it do for your product? To learn the answers, consult with an Industrial Finish Engineer. For the Finish Industry has technical ability to make finishes equal to the purpose for which each product is bought. Remember, most of your customers *start buying with the finish in mind.*

Now this table loves wet glasses! The Problem: Furniture manufacturers wanted a way to keep wet glasses from ruining furniture finishes and leaving white rings.

The solution: Industrial Finish Engineers were called in. Developed a special finish that not only laughs off water stains, but also resists heat, abrasion, alcohol and food stains. As a result, furniture makers have an extra selling point—a better product.

The better the finish - The better the buy!

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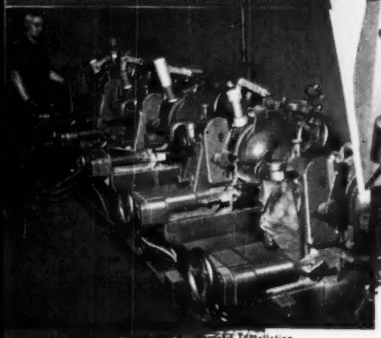

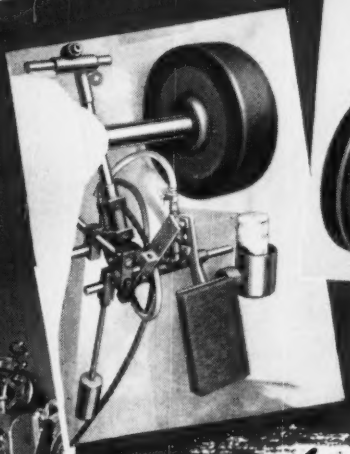

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SIMPLIFY MAINTENANCE—The only actuating power is gravity, hence there are no complicated motors, gears, switches or other mechanisms demanding frequent attention. The small air-cylinder which trips the counter-balance requires no lubrication. Appli-matics are bronze bushed throughout for long life.

PRODUCE SUPERIOR WORK—You get all the desirable results of costly hand application. Your operator uses his training, skill and judgment to build a good "face," applies compounds at any time or at any work position in cam-operated automatics, thus avoids loading of the work. Your "too much or too little" problem is solved. For complete information, see your Wagner representative or send for new bulletin.

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Economy Can Be Expensive!

Only QUALITY PLATING assures repeat business

Pity the poor consumer . . .

He doesn't know how to make a Magnegage reading or otherwise determine whether his purchase has a "quality" plate of lasting finish . . . or a "flash" plate.

But wait until the article has seen a little service. One with a flash plate will be quickly disfigured by rust or other corrosion products.

Naturally, since both items look alike in the showroom, the consumer is inclined to purchase the less expensive product which derives some of its price "advantage" (?) from a cheaper finish.

This economy proves to be expensive to everyone concerned:

EXPENSIVE to the consumer because he has an unserviceable article which requires replacement, or demands excessive maintenance to keep presentable . . .

EXPENSIVE to the retailer who must rectify the complaint or lose the good will of the consumer . . .

EXPENSIVE to the manufacturer of the low quality item, since he fails to receive repeat orders from the retailer . . .

EXPENSIVE to the manufacturer of the better quality product, because of consumers' inability to distinguish it from an inferior one . . .

EXPENSIVE to all platers, because of the *"black eye"* given to the use of metallic finishes.

Adoption of, and adherence to, proved specifications can eliminate this false economy and put metallic finishes on an evaluated quantative basis where "efficiency", rather than "short cuts", contributes to a true economy.

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For greater customer convenience, Cowles H D Cleaner is packed in Leverpak drums, 400 lbs. net.

Prompt shipments from convenient warehouse stocks.

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Cowles Chemical Company

METAL CLEANER DEPARTMENT • CLEVELAND 3, OHIO

editorial

Vol. 14, No. 6

MARCH, 1950

Pass "The Word" Along

Our ex-Navy readers will remember the expression, "The Word," as a term used in the Navy to designate general information and the dissemination of the same.

It is vitally important, in a modern industrial organization, to spread "The Word" about finishes to all the members of the organization concerned with the designing, planning, applying, or testing of finishes.

Members of the technical and supervisory staff, such as product engineers or designers, process engineers, finishing supervisors, chemists, and metallurgists, should have a good background in the fundamental principles involved in the application and usefulness of various finishes, whether metallic (plated or hot dipped coatings), organic (paint, lacquer, japan, and enamel), or inorganic (porcelain enamel). Such men can keep their knowledge up to date by reading technical society publications and technical or trade magazines, and by attending technical society meetings and conventions at which recent developments in finishing techniques are discussed.

The wealth of information thus accumulated, to which may be added that gained in daily experience, should be passed along to job foremen, group leaders, platers, and finishers to stimulate their thinking and enable them to have more knowledge about their jobs and how to perform them. Some large companies, realizing the value of this practice, conduct "seminars," or discusion groups, so that various members of the production team may profit from an exchange of knowledge and experience. It is only natural that, as men learn more about the work they are doing, they become more interested in doing better work, and producing finishes of higher quality.

Certain manufacturers of finishing equipment employ the very commendable practice of conducting short training courses for finishing foremen (and other interested groups) to demonstrate sound finishing methods.

By means of information contained in editorial and advertising pages, PRODUCTS FINISHING helps spread "The Word" about finishes and modern finishing practice to the engineering and supervisory group concerned with finishes on metal. The information thus provided makes easier the task of passing along to other members of the finishing team "The Word" about quality finishes and how to produce them.

E. A. Blount

Well-Planned Painting, and Produces High Cabinets

By EZRA A. BLOUNT, Editor

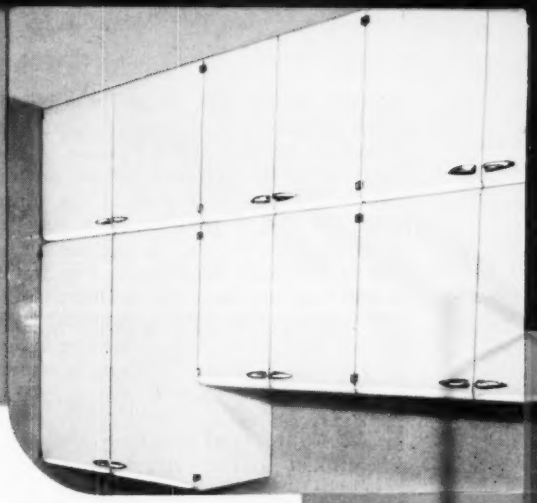
PF FEATURE

In the plants of Lyon Metal Products, Inc., at Aurora and Chicago Heights, Illinois, some 2900 steel products are manufactured. In this group are included storage cabinets, filing cabinets, tool boxes, work benches, steel shelving, lockers, bins, general shop and display equipment, and kitchen cabinets. It is the purpose of this article to describe the ultra-modern finishing installation in the Aurora plant devoted to the production of kitchen cabinets.

The company, formed in 1928 as a result of a merger of Lyon Metallic Manufacturing Company and Durand Steel Locker Company, will be remembered for the slogan, "You furnish the steel, Lyon will build the product." The use of this slogan in 1948 resulted in so much increased business that 51 per cent of the profit dollar was derived from products manufactured from customers' steel. This campaign won for the company the Putman award in 1949, for the most effective use of industrial advertising.

The Lyon Kitchen Cabinet Department, in which the new finishing system is installed, is entirely separate in operation from all other shop departments, so that the departmental management can concentrate on the production of just one line of products—kitchen cabinets. In this department, under the management of D. E. Corsolini, are produced base cabinets, sink cabinets, cleaning and implement cabinets, wall cabinets, orna-

Cleaning, Spray Baking Setup Quality Kitchen



Two separate cleaning systems, automatic paint spray equipment, and two sets of conveyors, each operating at a different speed, are among the plant features which enble Lyon Metal Products, Inc., to produce kitchen cabinets rapidly and efficiently. Rigid control of the finish is maintained, so that quality standards are well above the minimum standards set by the Steel Kitchen Cabinet Institute.

mental corner shelves, and similar products which can be grouped or assembled into an attractive, modern kitchen unit. Accompanying illustrations show some individual cabinets and assembled units.

In addition to the high-quality white finish applied to the products, Lyon kitchen units are designed with smoothly rounded corners on cabinets, drawers, and doors to enhance the appearance of the unit and eliminate the hazard of injury. Thorough sound insulation of all drawer and door fronts, and end panels ensures quiet operation and the elimination of all unnecessary metallic noises. Shelves are instantly adjustable on 2-inch centers by means of two simple quick-snap adjusters. The rigidity of the shelves, coupled with their quick adjustability, provides safe storage and allows easy removal for quick cleaning. Another exclusive Lyon feature is the Tap-o-matic door handle, which opens the door on the application of light pressure, yet locks positively when closed. Drawers glide open quietly on ball bearings, and close against rubber bumpers. Positive stops prevent the drawer from being accidentally pulled out of the cabinet. These are just a few of the many features of Lyon kitchen cabinets, which are distinctively styled for any kitchen.

Fabrication

Sheet metal fabrication, prior to finishing, consists generally of shearing, notching, forming, welding, and such sub-assembly as is per-

formed before the finish is applied. Steel is sheared in one department, and delivered down a straight aisle to the fabrication department, which is laid out in bays on each side of the main aisle. In Fig. 1 may be seen several press brakes performing various forming or punching operations. Figures 2, 3, and 4 picture several cabinet assembly welding operations, showing how simple spot welders and more complicated special jigs for welding are used in various cabinet fabrication operations.

Material Handling

Cabinet doors and drawer fronts are fabricated from electrolytically zinc-coated and phosphatized steel, while the bulky cabinet parts are fabricated from untreated steel and phosphatized after fabrication. This condition requires two separate finishing conveyors and systems, since the cleaning and processing arrangements for the two different kinds of parts are necessarily different. Figure 5 shows the two separate conveyor systems. Also, since the loading stations for each class of work are on opposite sides of the fabrication department, it can be further pointed out that fabrication of each type of work is performed on corresponding sides of the room—divided by the central traffic aisle.

The completely conveyorized finishing and assembly system, shown diagrammatically in Fig. 5, occupies an area 100 feet square on each of two floors of the Lyon plant and employs 5000 feet of conveyor. Since doors and cabinets are handled separately on two systems, and since the two groups of parts must meet at the assembly tracks, the Lyon-designed conveyor system, synchronized to bring these parts together at the proper time and in the proper order, is a major accomplishment. The overhead conveyors, built by the Richards-Wilcox Mfg. Company, are of the enclosed chain drive type. The conveyor used to transport cabinet parts is of the single-track type with flat attaching hangers upon which can be hooked the various parts to be finished. The conveyors used in connection with flat parts (doors,

Fig. 1—A view of one section of the fabrication department. Material is handled on pallets which are transported by lift trucks.

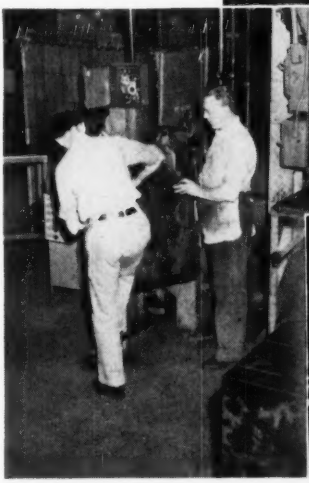
drawer fronts) are of the double-track type, one track containing a positive chain drive with extending pusher arms, and the other track fitted with free rolling, swivel hangers upon which the products can be hung. Views of both conveyors are shown in many of the accompanying photographs.

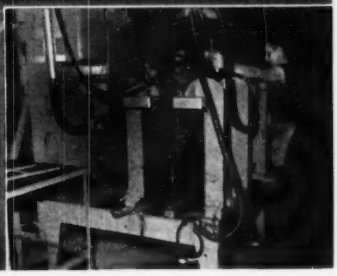
The Finishing Process

Doors, fronts and liners fabricated and assembled with intermediate insulation, are racked on hangers, either 4 or 6 to a hanger, as shown in Fig. 6. The loaded hangers are conveyed to the entrance of a Blakeslee pit-type vapor degreaser, and there automatically swivel 90 degrees as they follow the track which descends sharply into the degreaser. Solvent vapor, formed in the bottom of the steam-heated degreaser, condenses on the cool door panels and flows back into the bottom of the unit, carrying with it any light oil or grease present on the panels as a result of fabricating operations. Since the steel used to form the doors was previously zinc plated and phosphatized in the steel mill, only the one cleaning operation need be used to clean the parts prior to painting.

Leaving the degreaser, door panels are carried overhead into a closed cooling area, into which air is blown with fans, counter-current to the direction of motion of the conveyor. This prevents any vapor from the degreaser from entering the enclosed, pressurized finishing room, and ensures that all vapor is removed from the parts before they are painted.

When the panels enter the finishing room (which is supplied with filtered





Figs. 2, 3, 4 — Three views of different resistance welding operations, illustrating the use of various simple and more complicated welding jigs and fixtures

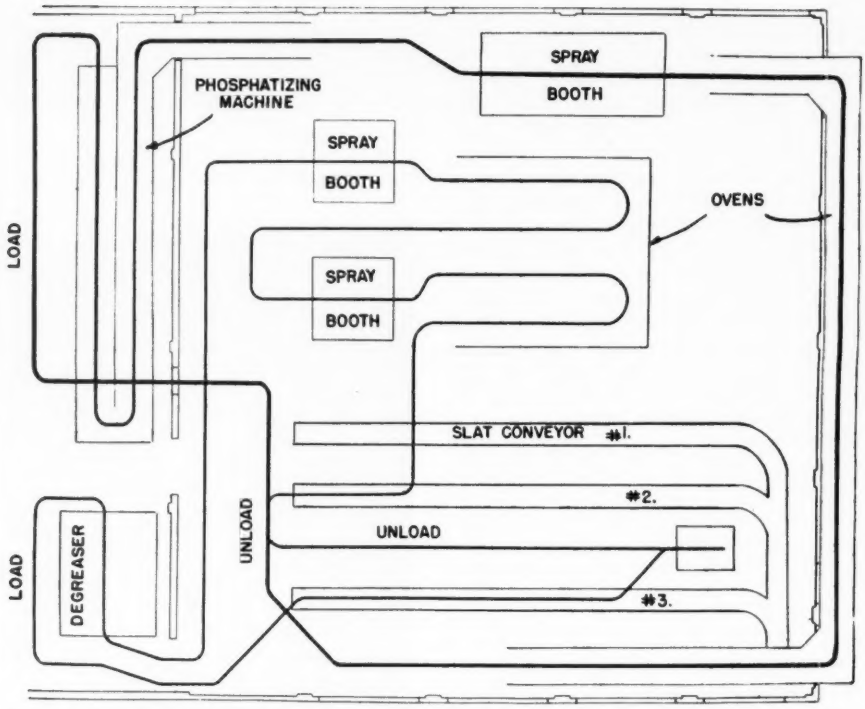


Fig. 5—Schematic diagram illustrating the arrangement of the finishing and assembly departments, with particular reference to conveyor location and material flow

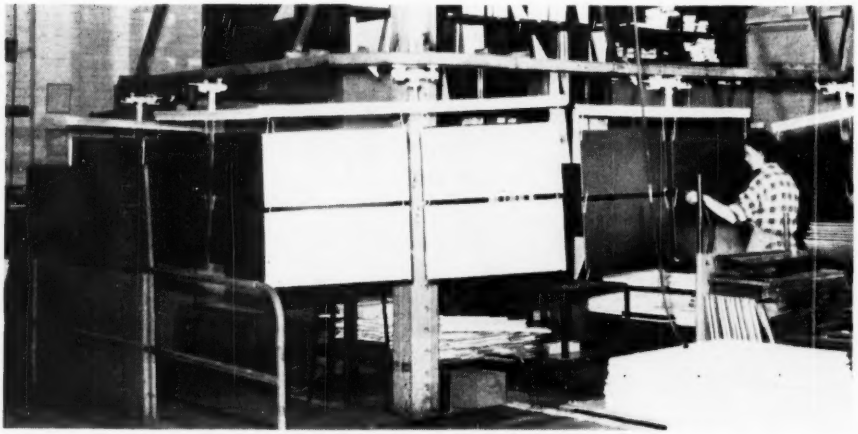


Fig. 6—Racked cabinet doors receive a final dusting with compressed air before they enter the pit-type degreaser en route to the finishing room.

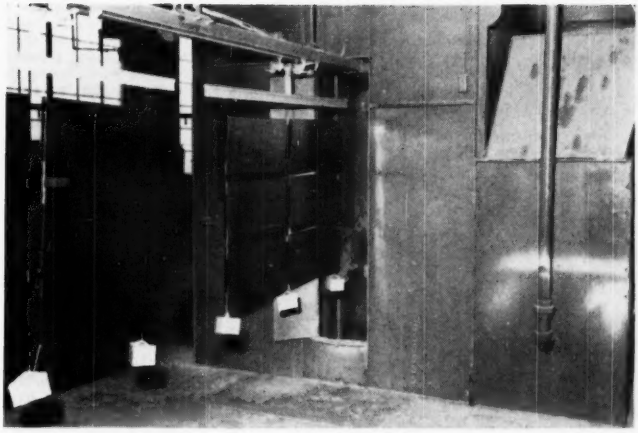


Fig. 7 — Cleaned, dried, and "tacked off" cabinet shelves are conveyed through a DeVilbiss two-stage water-wash spray booth and sprayed automatically.

air), they are "tacked off" with Detroit Handy "Tac" Rags to make sure that no dust particles remain on the surface to be covered with paint. Then weights are hung on the bottom panels on each rack to keep the panels from swinging as they pass the spray guns. Panels then enter a two-stage, water-wash automatic spray booth, as shown in Fig. 7, where two batteries of four guns each, traveling vertically, apply either Du Pont or Nubian special zinc oxide pigmented primer to all exterior surfaces (one stage and set of guns coats the fronts, and the second unit coats the backs).

To ensure efficient, uniform operation, the system is designed so that a conveyor stoppage automatically shuts off auxiliary equipment; a blank spot in the conveyor load stops sprays.

Reference to the floor plan (Fig. 5) will indicate that the primed panels move directly to the oven located directly behind both spray booths used for door and drawer fronts. Figure 8 is a view of the oven entrance showing primed panels about to enter the overhead, gas-fired, baking oven. As the racks of panels approach the oven entrance, they again are swiveled 90 degrees, and, in addition, they are picked up by a power drive which moves

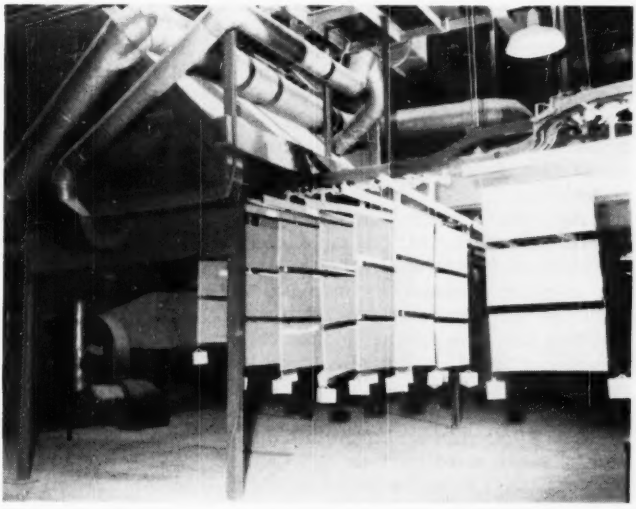


Fig. 8—Primed doors swivel 90 degrees and are picked up by the slow-speed drive of the oven conveyor to be carried through the gas-fired oven for a 30-minute bake at 350 deg. Fahrenheit.

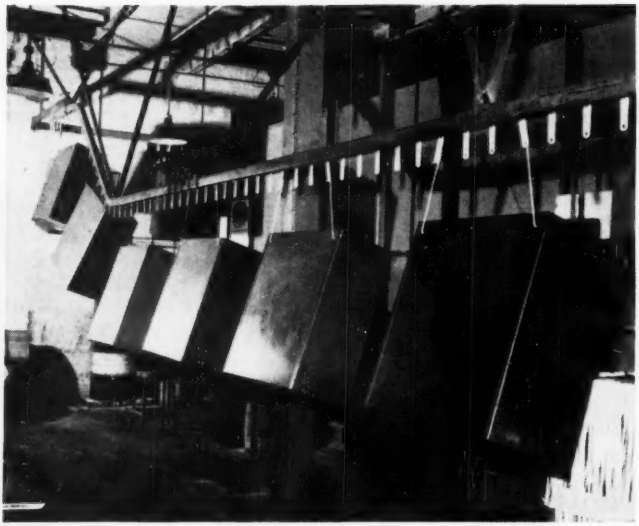


Fig. 9 — Cabinet bodies, suspended from the Richards-Wilcox single - track conveyor, pass in front of the spray cleaning and phosphatizing installation before making the turn to enter the machine.

one-sixth as fast as the main conveyor drive. As can be noted in Fig. 8, the panels are now spaced quite closely adjacent to one another so that the combination of a relatively small oven with slow speed conveyor fulfills finish specifications for a one-half hour bake at 350 deg. F. for primer and still furnishes the proper number of finished parts per hour to synchronize with cabinet and assembly line production. Lyon engineers are of the opinion that a slow cure produces a more uniform cured film, and this principle, of course, was taken into consideration when the finishing system was designed.

After the primer baking is completed, and as the racked panels leave the oven, they are again picked up by the regular transport conveyor and swiveled 90 degrees to be in proper position for the application of finish enamel. Forced air cooling reduces panel temperature so that the final enamel coat can be applied. The final finish is applied in an automtaic spray booth identical to that used to spray primer, and, as can be noted in Fig. 5, the panels pass directly back to the oven where the white finish enamel is baked 30 minutes at 300 deg. F. The same system for moving the panels through the oven slowly, described for the primed panels, is employed again for the panels coated with finish enamel. Finished cabinet doors and drawer fronts are conveyed down to the assembly floor where they are unloaded between assembly conveyors 2 and 3 (see Fig. 5) so that they can be assembled on cabinets moving down both conveyors. The empty transport conveyor then winds to a lower floor so that trolleys and carriers requiring stripping can be removed and freed from paint by cleaning in hot caustic soda tanks. The conveyor then returns to the door fabrication department so that the finishing cycle can be repeated. The finishing cycle just described requires approximately 2 hours, as does the finishing cycle for cabinets of various kinds.

Cabinets, fabricated from steel, require more elaborate cleaning and surface treating operations than do doors. Cabinets are suspended by hooks from the simple, flat, perforated carriers on the Richards-Wilcox single—track overhead chain conveyor (see Fig. 9), and processed through a 5-stage spray cleaning and phosphatizing unit fol-

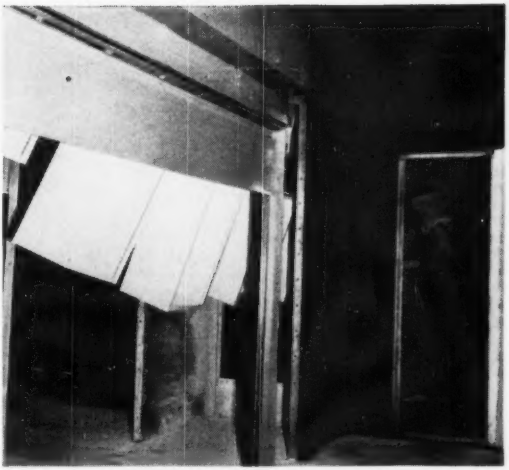


Fig. 11—Painted cabinet bodies and bases pass from the large spray booth into a long gas-fired oven, located outside the factory building proper, for baking.

lowed by a drying oven. As can be noted by reference to Fig. 5, the conveyor makes a hairpin turn in the center of the cleaning and surface treating cycle. The first three stages of the cycle are located ahead of the turn and the other two are located on the return bend. This makes possible a more compact unit. The treating cycle is as follows:

1. Emulsion cleaner, operated at 140-160 deg. F.
2. Hot water rinse, 145-165 deg. F.
3. Bonderite 1000, 145 deg. F.
4. Cold water rinse.
5. Parcolene rinse, 135-145 deg. F.
6. Dry-off oven, 350 deg. F.

Figure 10 shows phosphatized and dried cabinet bodies entering the finishing room and passing on to the large water-wash spray booth in which a final finish enamel coat is applied. Figure 11 shows the coated cabinets leaving the spray booth and entering the long enamel baking tunnel or oven, located outside the factory building proper. In Fig. 5 can be noted the path of the cabinet conveyor which carries the parts through the long oven, where the finish coat is baked for 30 minutes at 300 deg. F., and then down to the assembly department, a view of which is shown in Fig. 12. Figure 13 is a general view of the assembly area showing the cabinet conveyor line at the rear, with the door conveyor line passing between assembly tracks 2 and 3. Not shown in the photograph is the slat conveyor which carries the assembled cabinets through the packaging opera-

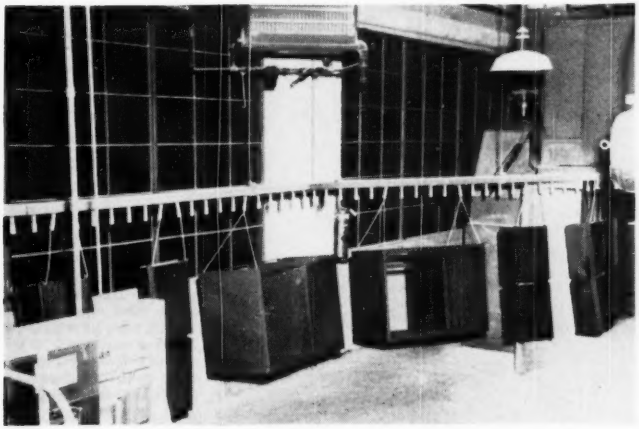


Fig. 10 — Cabinet bodies and drawers emerge from the phosphatizing machine and drying oven into the pressurized finishing room, supplied continually with filtered air.

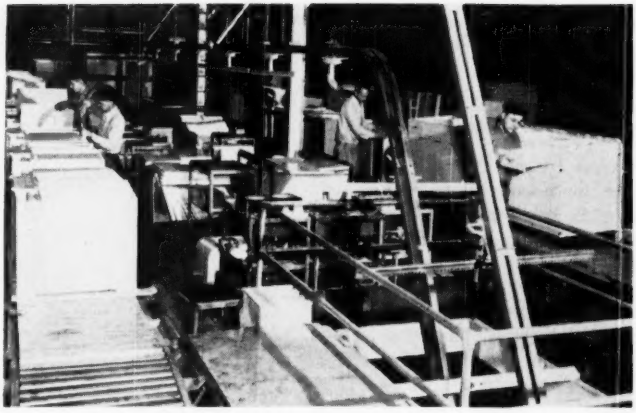


Fig. 13—The two Lyon-designed, synchronized conveyor systems meet in the final assembly department. In the center foreground may be seen the door conveyor, from which the doors have been unloaded. Cabinet bodies are unloaded in the center background of the photograph, so that they may be attached to the wooden shipping bases, upon which the cabinets are assembled.

tion and out to the loading docks.

Paint Handling System

Paint in drums is mixed thoroughly on a drum rotator and then put into 120-gallon tanks, two of which are connected to each of the three paint systems (see Fig. 14). Thinner or reducer is added as needed and the paint in the system is then circulated continuously through the system and agitated continuously while in the tank. Such treatment ensures continuously uniform paint, which can be depended upon to produce a uniform finish. Spray booth overspray paint is returned, suspended in the water by a water-wash compound, to one of two 10-foot concrete collecting tanks. Here most of the paint rises to the surface of the water-wash solution and is skimmed off, or is caught by baffles or screens through which the water passes on its way back to the booths. Paint reclaimed in this manner is returned to the manufacturer to be reprocessed.

Quality Control

Both in joining several cabinets to form one assembly, and in assembling a porcelain enamel top to a painted cabinet, the two chief problems are finish appearance and color matching to secure a uniform shade of white in all cases. To conform with standards set up by the Steel Kitchen Cabinet Institute, and to secure a uniform color, finish thickness is held between

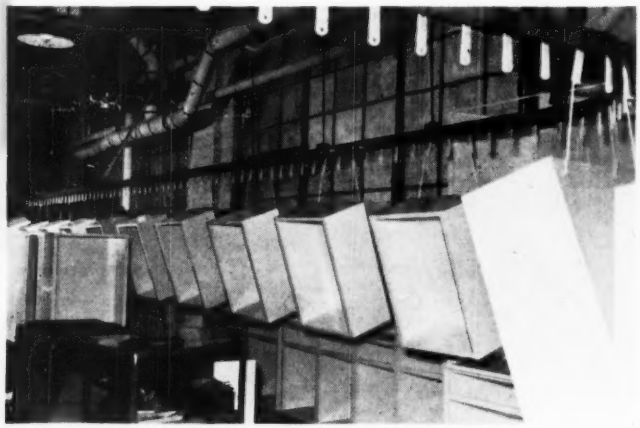


Fig. 12 — In the left background of this photograph may be seen the point at which the cabinet body conveyor descends from the baking oven and enters the assembly department.

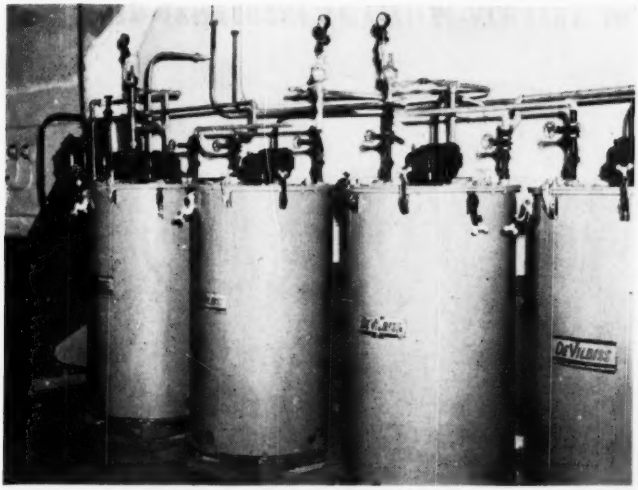


Fig. 14 — Paint is adjusted to the correct consistency for spraying and placed in 120-gallon storage tanks, where it is agitated constantly. The paint is continually circulated between the storage tank and the points of use.

●

0.0018 and 0.0022 inch. A General Electric thickness gage is used to measure dry film thickness. Paint is checked daily in the paint laboratory, a view of which is shown in Fig. 15, for solids content and viscosity, two additional factors that influence color. Oven temperature and baking time, once established, can be controlled automatically. Since film thickness is perhaps the most important factor in the production of a finish of uniform color, the Lyon finishing system was designed to separate doors from cabinets so that the doors could be sprayed and handled automatically and that a uniform film thickness could thus be obtained. Such a system has provided excellent thickness control, and is one of the reasons for the high quality and uniformity found in Lyon products. Other reasons include: sound engineering design of product and finishing system, careful attention to all details and variables of the finishing process, and constant investigation of new and better ways to improve both product and process.

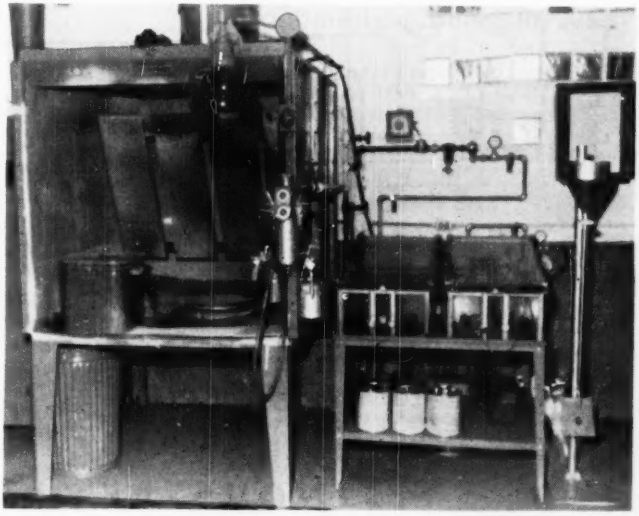


Fig. 15 — A view of one corner of the well-equipped paint laboratory where all variables of the finishing process are checked and controlled. Preliminary tests on new products are also made here.

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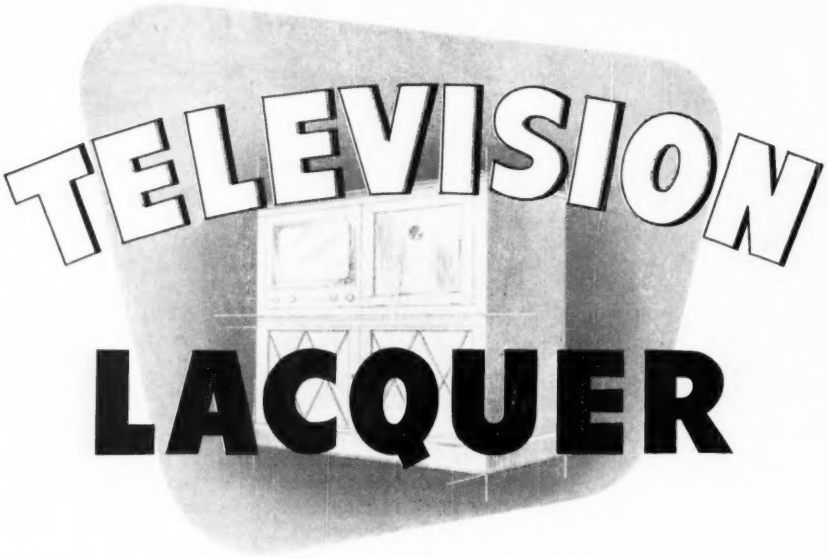

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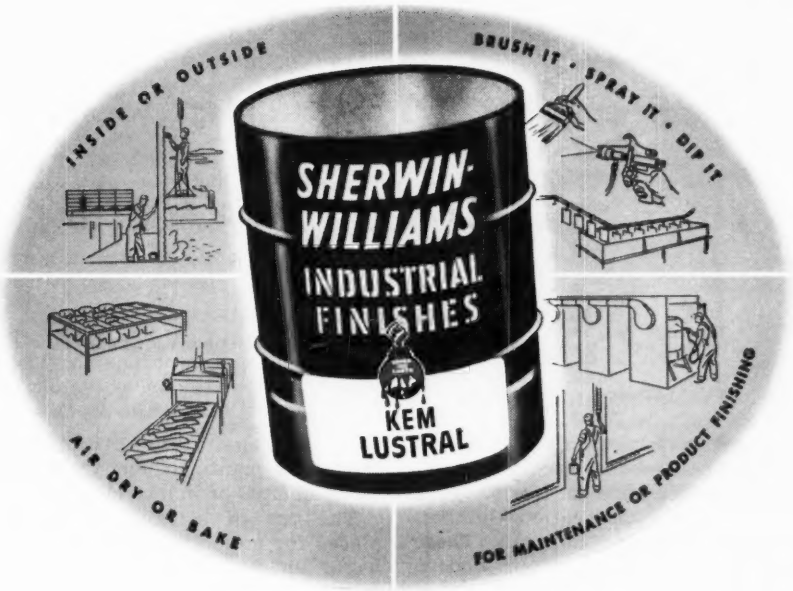

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Stream Pollution and The Plating Industry

By C. FRED GURNHAM,

Professor and Chairman, Department of Chemical Engineering, Tufts College, Medford, Mass.

WE have heard much in recent years about our natural resources, and the necessity for their conservation—lumber, petroleum, coal, and minerals. These materials are essential to our modern life, both in war and in peace, and it is important that they should not be squandered recklessly, since their available supply is definitely limited. As as rule, we have been less concerned about an even more essential natural resource—water, because the supply appears limitless. We frequently overlook the fact that, although the quantity of water may be abundant, its quality may be so poor that the water is useless for the desired purposes.

The reasons for poor quality may be natural and obvious in many cases: If we sink a well in a coastal area, we expect to obtain a brine or brackish water, not pure water suitable for drinking. If we impound stream flow from a swampy area, the water is colored and not suitable for paper, textile, and similar industries. If our water supply comes from a limestone region, we expect it to be hard, and of poor quality for laundry and power plant uses until it has been treated. These inferior waters are caused by natural conditions, which we sometimes cannot avoid, and which we must overcome by the installation of treatment plants to purify the water for municipal or industrial use.

The use of streams as dumping places for municipal sewage, for garbage, and for the waste products of our industries is a far worse type of contamination, and is a practice which we must stop if we are to restore and preserve this natural resource in a healthy and useful condition. It is true that most streams have the power of absorbing sewage and wastes in moderate quantities without becoming polluted, and it is quite proper to utilize them in this manner. But when a municipality discharges its untreated sewage into a small river, the overload of pollution cannot possibly be absorbed by any natural purification process. The downstream waters will become devoid of dissolved oxygen, so that fish life will disappear, sludge deposits will form in the river bed, and the entire stream will be malodorous, offensive in appearance, and unfit for bathing or other recreational use and for utilization as a water supply for domestic purposes or for industry.

The discharge of industrial wastes may be equally disastrous. Toxic substances, such as metal salts and cyanides, cause fish kills and also stop the natural purification processes which

the stream possessed. Oily materials may produce an unsightly film, which prevents oxygen absorption by the stream, resulting in destruction of stream life and giving rise to decomposition odors. Solid wastes form deposits in the stream bed, and their putrefaction further pollutes the watercourse. Any of these materials can render the stream unfit for the downstream neighbors, either for drinking or for other purposes.

Legislation

The Izaak Walton League and other conservative groups have fought the destruction of our streams for many years. Most municipalities and manufacturers have ignored this, or have claimed that streams are the natural receivers for waste products and have been used in this manner for centuries, forgetting or disregarding the fact that streams have been getting more and more overloaded with pollution as the municipalities and industries have grown. In recent years, public opinion is more actively supporting the conservationists, and indiscriminate dumping of sewage and wastes is severely criticized. Government authorities, following the dictates of public opinion, are taking steps to reduce or eliminate stream pollution, so that cities and manufacturers alike must now admit the existence of the problem and take measures to relieve it.

The Congress of the United States has discussed stream pollution, and has considered regulatory bills, in almost every session since 1897. In 1948, Public Law 845 (80th Congress) was enacted on the last day of the session, so the beginnings of federal legislation on the matter have now been made. Most of the teeth were removed from this law before its passage, so that its principal features are authorization for the federal government to interest itself in the subject of stream pollution and to cooperate with local governments on pollution studies, and author-

C. Fred Gurnham

C. FRED GURNHAM is Professor and Chairman of the Department of Chemical Engineering of Tufts College, Medford, Massachusetts. He is also engaged in consulting work in the chemical industries.

Dr. Gurnham received his bachelor's degree from Yale University in 1932, and later degrees from New York University in 1940 and 1942. He is a licensed professional engineer in several states.

As an active member of the American Electroplaters' Society, Dr. Gurnham was largely responsible for the establishment of Research Project 10, organized to investigate the disposal of plating room wastes. He served as chairman of this project until recently, and is at present an advisory member of the committee. He has also served as one of the chairmen of the Research Directing Committee of this Society, and is a past president of the New Haven Branch.

Dr. Gurnham is also a member of the American Chemical Society, the American Institute of Chemical Engineers, the National Society of Professional Engineers, the New England Sewage Works Association, the Electrochemical Society, and several other technical organizations. He has spoken to a number of groups on waste disposal problems in the metal finishing industry, and has written a number of articles on this subject.

ization of loans for the construction of treatment plants. A Water Pollution Control Advisory Board has been appointed, and is active at present. It seems likely that this law is only the beginning of federal legislation regulating stream pollution, and that restrictions and enforcement policies will be established within a few years.

At the present time, the authorities most actively engaged in pollution control are the water resources boards and the health departments of the individual states, and the sewer commissions in some of the larger cities. In a number of cases, several states have joined a common compact for joint control of an interstate river basin or coastal area. These are the groups that have the powers of establishing and enforcing anti-pollution regulations, and which may compel the installation of treatment plants or impose fines for the continued discharge of wastes into streams. Construction plans for treatment works must generally be approved by those authorities, and the permissible limits of impurities in the discharge liquor and in the receiving streams are set up by their engineers.

The discharge of industrial wastes into city sewers may be fully as objectionable a matter as their release into natural streams. These wastes may attack sewer pipe, pipe linings, or jointing compounds, or they may cause corrosion of equipment at the treatment plant. In some cases, they may not be affected by the treatment process, so that they still cause stream pollution below the sewer outfall. Most sewage treatment processes are based on biological action, which is highly susceptible to the presence of acids, metals and other constituents of industrial wastes. Accordingly, the dumping of wastes into sewers is usually prohibited or at least closely controlled by the sewer commissioners.

Electroplating Wastes

The wastes from the electroplating industry are extremely toxic, and hence are particularly objectionable in streams and in sewage treatment plants. For this reason the industry is receiving the attention of the stream control boards in many states, and of city sewer commissions. There have been a number of cases reported where the unintentional or unwitting discharge of a spent plating solution caused extensive stream pollution, resulting in the killing of thousands of fish. In other cases, the whole operation of a sewage treatment plant has been upset for days following the dumping of a plating tank into a municipal sewer.

Most electroplating plant wastes are acid in nature, due to the preponderance of low pH plating solutions, metal pickling baths, bright dips and similar process solutions. Acid wastes are harmful in sewers and in sewage treat-

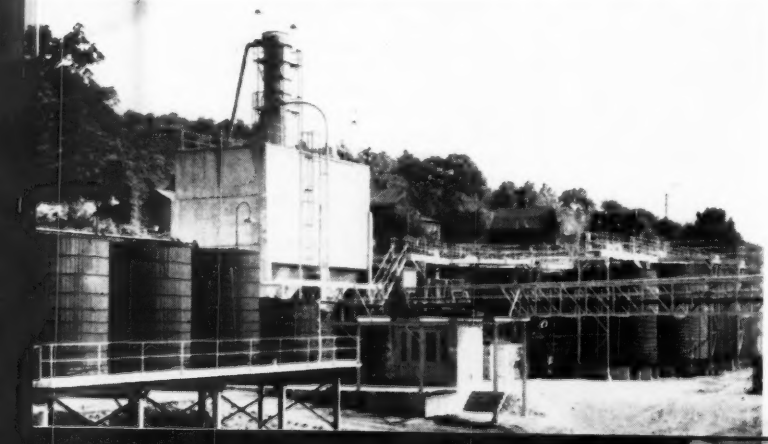

Fig. 1—Overall view of the waste treatment plant of Talon, Inc., at Meadville, Pennsylvania *(Photo courtesy Talon, Inc.)*

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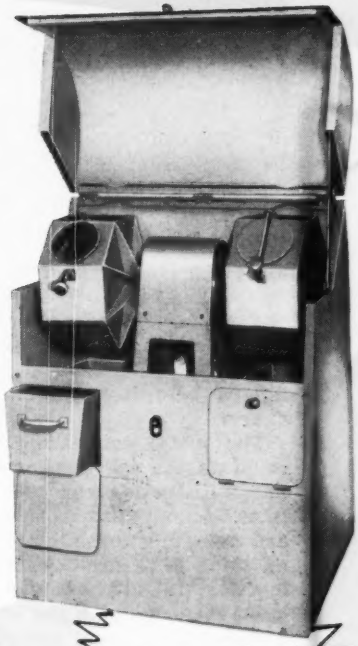

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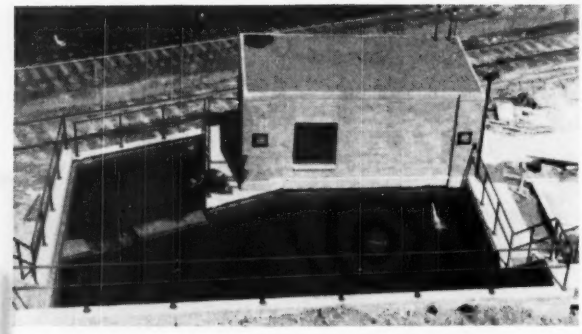

Fig. 2 — Waste treatment tanks and control house, Western Electric Company, Inc., Allentown, Pennsylvania *(Photo courtesy Western Electric Company, Inc.)*

ment plants because of their corrosive nature, and in natural streams because of their toxic effect on aquatic life. In most cases, it is a fairly simple matter to neutralize excess acidity of waste liquids before permitting their discharge.

The metal constituents of plating room wastes are also harmful, both to natural streams and to sewage systems. Among the most toxic metals are cadmium, chromium, copper, lead, and zinc. Nickel is possibly somewhat less harmful, although varying reports have been made on the effect of this metal on biological processes. All of these metals are toxic when they are in soluble form; some have the further disadvantage that their insoluble compounds may acccumulate in sewage sludge digestion tanks and cause trouble. When this occurs, it is common practice to empty the whole digester, disposing of several months' accumulation of sludge by the best means available (which is rarely a satisfactory procedure), and then re-seeding the new digester charge to begin biological action again.

Of all plating room waste materials, cyanides have probably received the most attention, both from the public and from pollution control authorities. About eighty-five percent of all plating firms use cyanide solutions, so that cyanides are present in wastes from these plants. The high toxicity of the CN radical makes this a matter of concern to all. A number of processes have been proposed for the destruction of cyanides, and several of these are now in operation on a very large scale as well as in moderate size and small plants.

Alkaline cleaners do not normally present a disposal problem, because the overall discharge from a plating shop is generally acid. Unless the alkalies are dumped suddenly and in large quantity, they serve the useful purpose of partially neutralizing the free acidity. Other cleaners, especially the organic solvent types, are sources of pollution, and their discharge into streams or sewers should not be permitted. Alkali cleaners heavily contaminated with oils and grease should be treated before discharge to prevent pollution by the oily materials.

Insoluble solids are not desired in streams or sewers, and should be separated from all wastes before discharge. This includes the dusts and deposits formed in polishing, buffing, burnishing, tumbling and other mechanical operations, the deposits from water-curtain spray booths, sludges from pickling, cleaning and plating tanks, and precipitates formed by the interaction of various wastes or by treatment of the wastes.

Factors Affecting Treatment

Before making any measurements or analyses of the wastes from a plant, it is desirable to study the processes and operations within the plant. Fre-

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quently it is possible to make modifications in the plant procedures which will reduce the quantity of waste water and the amount of polluting substances discharged. This has the further advantage of economy in plant water requirements and in chemical consumption in the plating department. Counter-current recycling of rinse waters, and possible re-use of rinse water as plating solution make-up should be considered in this manner. Good plant housekeeping can reduce chemical and solution spillage and dripping, thereby conserving materials and reducing the pollution load. Increasing the drainage time of work over the plating tank and over the rinse tanks serves the same purpose. Continuous control and purification of plating solutions reduce the frequency of spoiled baths. Where acid dips, cleaners, and other solutions are regularly dumped and made up fresh, the addition of chemicals during the bath life should be timed to allow dumping at the minimum concentration. All of these points are obvious to the plater, but they are frequently overlooked in practice. In many cases, they can lead to substantial plant economies and to simpler waste disposal units.

Having made all possible economies within the plant, it is then necessary to investigate the nature of the wastes which remain to be treated. The quantity of waste can be measured, and this should be done in a manner which will indicate both the average flow rate and the maximum and minimum flow rates occurring during the working day. Similarly, analyses of the wastes should be made, on both spot samples and composite samples, to determine the average composition and the range of compositions over a period of time. These analyses should include each of the harmful or polluting ingredients, unless some of these can be estimated with reasonable accuracy from simpler analyses (for example, brass plating wastes might be analyzed for copper, and the zinc content estimated from the known composition of the plating bath). The nature of the wastes from the various units within the plant should also be known individually as far as possible, because certain wastes should be kept separate for easier treatment or for other reasons. As an example, acid wastes and cyanide wastes should not be mixed under any conditions which could lead to hazard to personnel.

In addition to the above studies of the plant process and the plant effluents, the available disposal facilities will need consideration. If discharge will be to a sewer, the requirements of the sewer commission should be studied in relation to the volume and

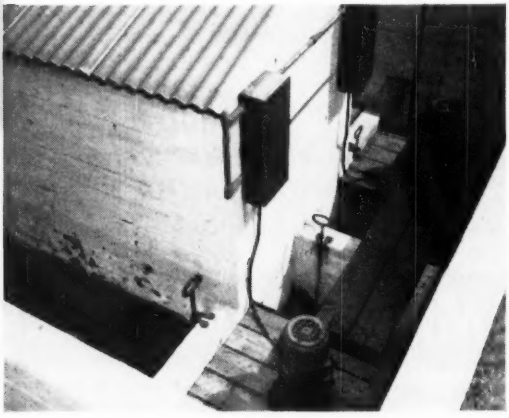

Fig. 3—A small plant for continuous automatic neutralization of acid wastes
(Photo courtesy Leeds and Northrop Company)

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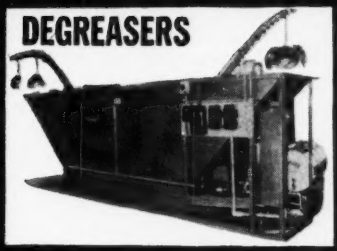

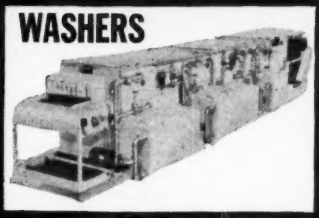

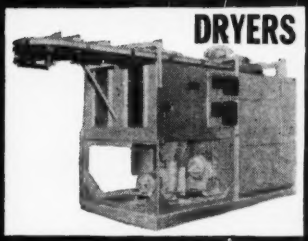

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composition of the waste, the volume of dilution available from the sewage flow at the plant connection, possible similar wastes in the sewage from other industrial plants, permissible concentration of specific waste materials in the sewage, permissable temperature of the discharge, and other such features. If discharge is to a stream or other natural body of water, or if it is to a dump or lagoon from which wastes may seep out to a stream or to groundwater, the pollution control authorities should be consulted as to dilution available, permissible concentrations of waste substances in the discharge and in the stream, and other aspects of the overall pollution picture of the stream. Possibly the stream has been classified, depending on its downstream use and future possible use, and on its present and future desired freedom from pollution; this will determine to a considerable extent the amount of added pollution which can be tolerated.

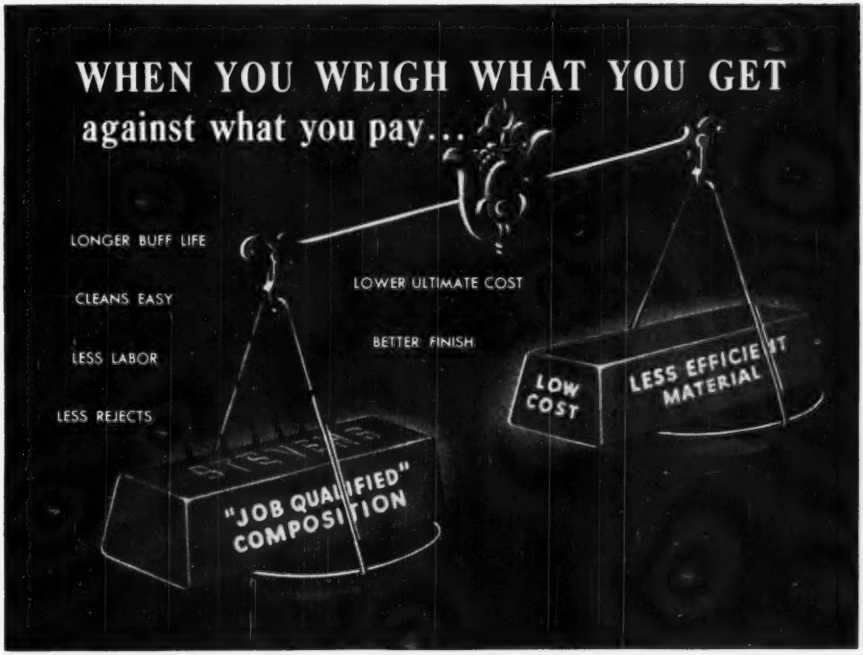
Types of Treatment

The treatment process for any specific plant should be recommended by the engineer after a study of many factors, including those listed briefly above. The conditions at various plants are so different that no recommendations should be made without an individual plant investigation. However, the principal treatment processes are outlined in the following paragraphs.

Removal of Insolubles. Insoluble solid matter and floating oils and solvents are usually removed from the waste before it enters any chemical treatment process. Heavy solids can be removed by settling in a grit chamber or a sedimentation tank; oils and floating solids can be removed by skimming during the same operation. Separation of these substances at this time prevents their fouling the subsequent treatment equipment, and may reduce the quantity of chemicals needed in the process. If the load of insolubles is light, its removal may not be required; and, if plant wastes are segregated, it may not be necessary to provide for solids separation in all of the waste lines.

Destruction of Cyanides. Cyanides must generally be removed before the heavy metals can be precipitated; hence this step comes early in the treatment process. There are several methods suitable for removing cyan-

Fig. 4—Maneely Chemical Company (left), a new company formed to recover useful waste products from spent pickle liquors and galvanizing wastes produced at the Wheatland Tube Company (right). Before these operations started, pickle liquors were discharged to the large lagoon in the foreground.
(Photo courtesy Maneely Chemical Company)



the balance is in favor of Stevens "Job-Qualified" Composition

The cost of buffing and polishing materials is an important factor in metal finishing and it would be wise to remember that very often the use of low-priced material may prove to be expensive in the long run. Savings involved in buying a barrel of "cheaper" composition may very quickly be wiped out by losses due to increased buff wear, rejects, extra cleaning costs, lost man hours—to say nothing of unbalanced output schedules.

On the other hand it would be equally foolhardy to buy only the highest priced materials without first checking composition performance on the job.

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ides, many of which have been described in technical journals. Among the processes in commercial use at the present time are: oxidation with chlorine or hypochlorites; acidification and removal of HCN gas to the atmosphere; formation of insoluble or nontoxic cyanides such as Prussian Blue; oxidation by electrolysis using insoluble electrodes; treatment with lime-sulfur.

Several other processes have been proposed, but are probably not in large-scale operation. Some of these may be promising, others are not economical or not feasible for other reasons. A partial list follows: oxidation with air, ozonized air, or oxygen; oxidation with permanganates, peroxides, perborates, and other chemical reagents; drying and heating the residue; reaction with aldehydes or ketones, especially formaldehyde; ion exchange reactions.

Many of these methods for destroying cyanides also result in precipitation of some of the metals in insoluble form, so that at least a portion of the metal content may be removed during this step.

Reduction of Chromates. Chromium is usually present in chromium plating solutions or in anodizing and similar solutions in the hexavalent form; that is, as chromate (bichromate) or chromic acid. In this form it can be precipitated and removed by the use of barium or lead salts. However, it is usually preferable to reduce the chromium to its trivalent condition, in which state it can be precipitated along with the other heavy metals, by neutralization. A number of reducing agents are being used for this operation, among them being: metallic iron, zinc, alloys such as brass, sulfur dioxide, alkali sulfites, sodium or other sulfides, hydrosulfites, and ferrous sulfate (copperas). The choice of reducing agent for a specific installation is largely a matter of economics, based on the size of the plant, the cost and availability of the chemical, and other factors.

Neutralization and Precipitation. After cyanides and hexavalent chromium have been removed, it is a simple matter to neutralize free acidity and to precipitate insoluble compounds of the heavy metals by treatment of the waste with any alkaline substance. Quick-lime and hydrated lime are cheaper than the soda alkalies, but they are not quite so easy to handle and they do result in greater quantities of sludge. They are commonly used in

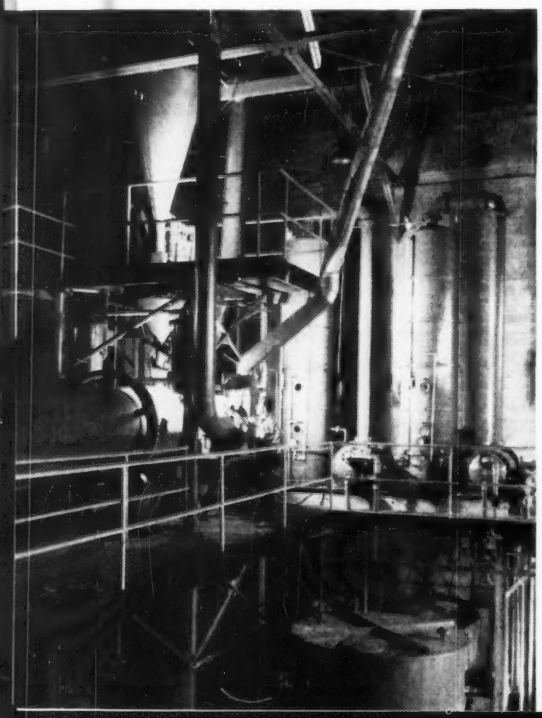
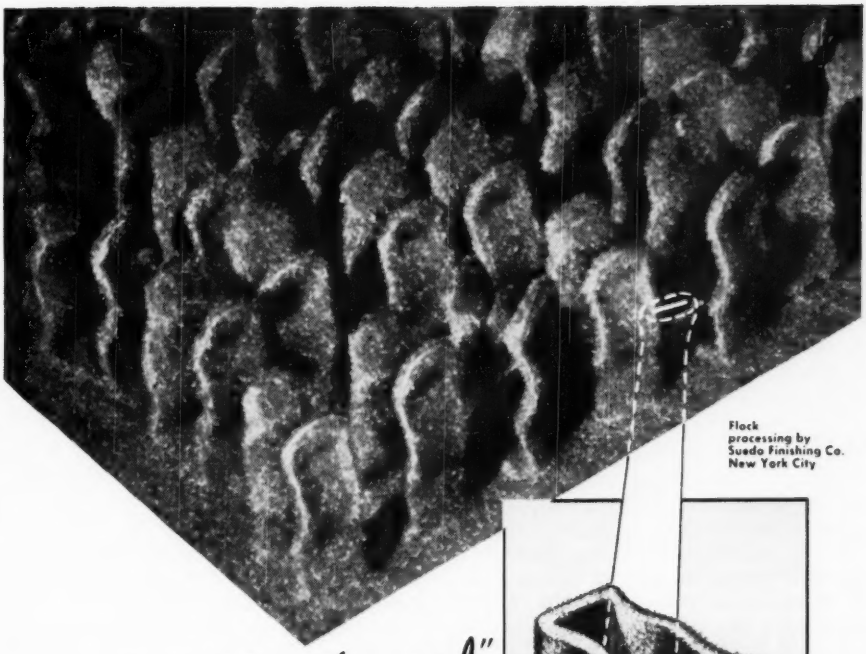


Fig. 5—An interior view of the Maneely chemical plant showing Buflovak evaporator-crystallizers (right), Hersey rotary dryer (left), and holding tanks (bottom). The evaporator-crystallizers separate zinc chloride from zinc sulfate by fractional crystallization. The rotary dryer handles zinc sulfate crystals. Zinc chloride stays in solution and is sold in drums.
(Photo courtesy Maneely Chemical Company)



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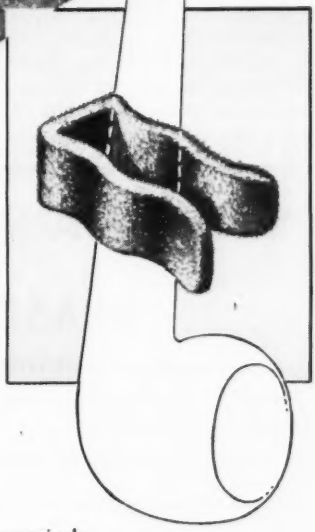

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the larger plants, where labor costs are minimized by the use of automatic equipment, so that material cost becomes an important item. Limestone is even cheaper, but its use has not generally been satisfactory because it reacts more slowly with the waste and because it tends to film over with an insoluble coating. The sodium alkalies, including caustic soda and soda ash, are more expensive than lime, but can be handled in simple equipment. They are used in most small installations. The neutralization process can be controlled automatically by pH control instruments, thereby decreasing labor costs and ensuring a completely neutralized effluent at all times.

Sludge Separation and Disposal. Many of the precipitates formed in waste treatment processes do not filter well, so that the common practice is to separate them by settling rather than by filtration. In either case the resulting sludge frequently presents a major problem in its disposal. Trucking to a dump or burying are the usual practices. Care must be taken that the dumps are protected from children or animals who might be poisoned by the deposits; it may also be a matter of concern if soluble toxic materials could be leached out of the dumps and pass into streams or groundwater. These difficulties can be overcome, and these practices are general.

It is desirable to keep the sludge volume to a minimum for easier disposal. This is one advantage of sodium alkalies over lime compounds. Wet sludges are frequently lagooned for further drying before their ultimate disposal; the usual precautions are needed here against trespasssers and against seepage to streams.

Public Relations

Because of the growing interest of the public in clean streams, it is desirable for all plants to give some consideration to the treatment of their

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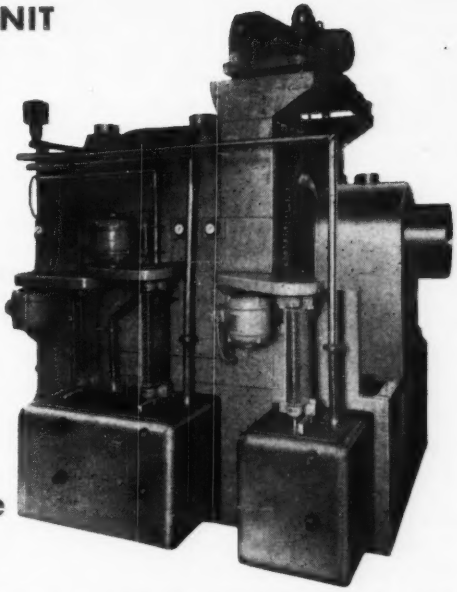

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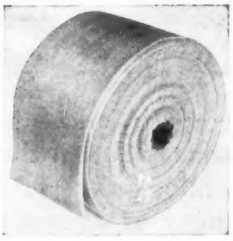
wastes. Not only is this rapidly becoming a requirement because of legislative action, but it is also a good policy from the standpoint of public relations. Efforts on the part of management to protect the purity of the natural waters are appreciated by the neighbors, and lead to a better employment situation and improved relations with the local community. It is seldom that an electroplating plant can hope to profit financially by recovery of waste waters, but the benefits in community spirit are worth while.

American Electroplaters' Society

The American Electroplaters' Society has recognized the seriousness of the waste disposal problem in the electroplating industry, and is conducting research on methods of treatment. This work is under the direction of Professor B. F. Dodge, of Yale University, and is controlled by a committee of practical industrial electroplaters. This work has already resulted in a number of technical publications, and will become even more valuable as it progresses.

This project, and other research projects in the field of electroplating, are supported by the Sustaining Members of the Society for the benefit of the entire industry. It is perhaps obvious that most of the truly progressive electroplating firms in the country are numbered among these Sustaining Members.

It isn't only the new bride who depends on a can opener for her "home cooked" meals. American food packers, in 1948, put about eight million tons of food into about 18,700,000,000 "tin" cans! This is enough to furnish each family in the United States with 459 cans during the year. All these cans required more than 2,300,000 tons of steel, thinly coated with tin.—*The Ohmite News*



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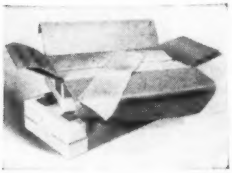

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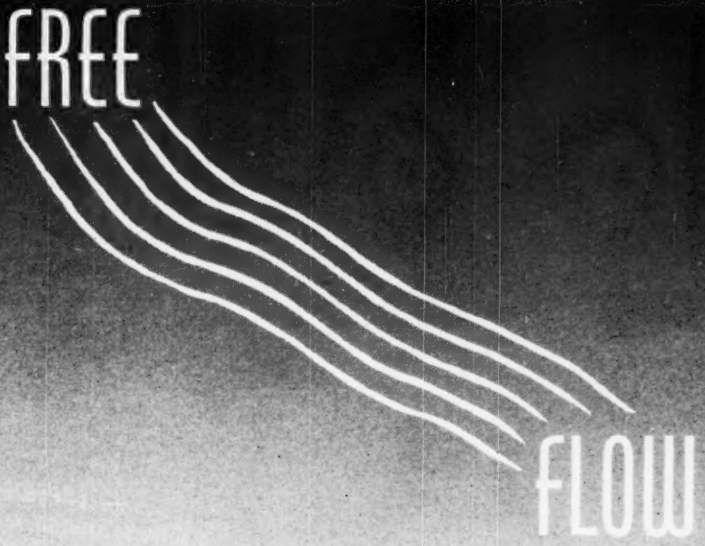

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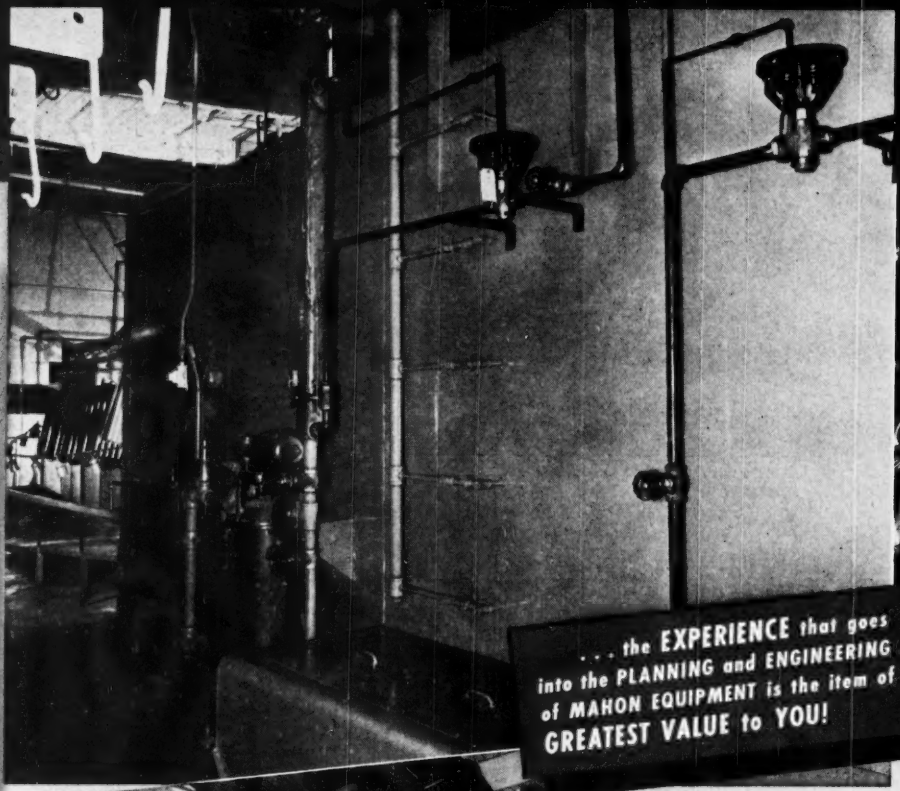

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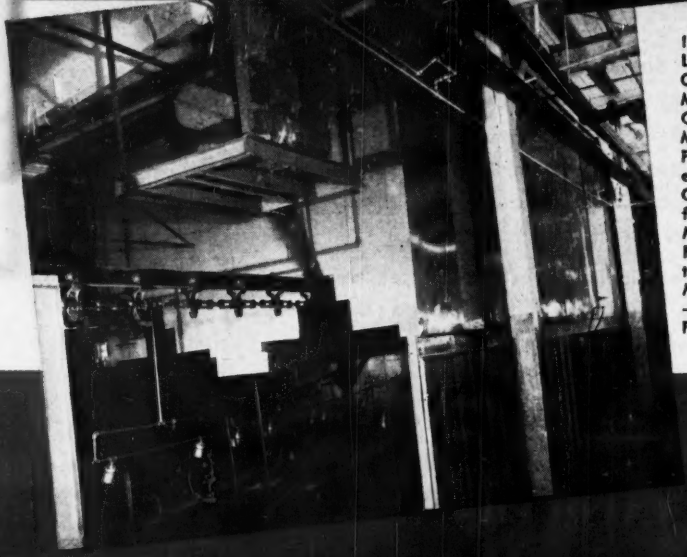

Illustrations from Right to Left: Parts of Plate-Type Condensers entering the Mahon Five-Stage Metal Cleaning and Rust Proofing Machine—first phase of the Finishing Process Parts emerging from Mahon Dry-Off Oven. Parts emerging from Mahon Flow Coating Machine and moving on to Finish Baking Oven Entrance and Exit end of Mahon Finish Baking Oven —the final phase of the Finishing Process.

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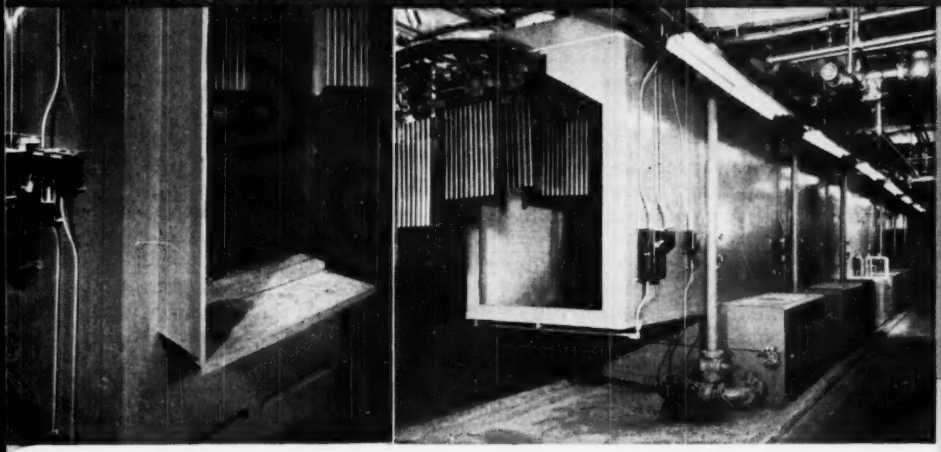

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On these pages, Mahon is pleased to illustrate the major units of a complete finishing system designed to process Plate-Type Condensers. It is installed in the plant of the North Chicago Division of the Houdaille-Hershey Corporation. Like all Mahon installations, this system was specially planned and engineered to do a specific job with utmost efficiency and economy. The complete system includes a five-stage Metal Cleaning and Rust Proofing Machine, a Dry-Off Oven, a Flow Coating Machine, and a Finish Baking Oven. Each phase of the finishing processes is coordinated and engineered into a continuous production line geared to meet the specific requirements of the manufacturer. This is another typical example of good planning and good engineering in modern production equipment designed to improve product finish and reduce costs. If you have a finishing problem, or are contemplating new finishing equipment, remember that the Mahon organization has pioneered development in this highly specialized field for thirty years . . . broad experience, in every industry where finishing constitutes a major production operation, plus constant research and experimentation, has endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. See Mahon's Insert in Sweet's Mech. Ind. File, or write for Catalog A-649

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AHON

New Seal Primer For Aircraft Finishing

By GILBERT C. CLOSE

THE inexorable progress of metal product finishing science in the past twenty years has bypassed or transformed many a tried and trusted product. This has happened now to zinc chromate primer, that familiar old greenish-yellow protective coating, conforming to Specification AN-P-656, that has been a standard in the aircraft industry for many years.

This does not mean that zinc chromate has fallen by the wayside—but recent tests prove that an addition of a clear synthetic alkyd resin to the primer will greatly improve its moisture resistance and retard moisture-induced corrosion of the underlying metal. Furthermore, with this resin content, the primer coating has better appearance, and subsequently applied enamel coatings are more glossy. These advantages are achieved without in any way affecting the primer's adherence to the requirements of the original AN specification.

This information and the new "seal primer" are the outcome of a series of service tests and experiments conducted by the Process Engineering Department at Northrop Aircraft, Inc. Under the direction of T. E. Piper,

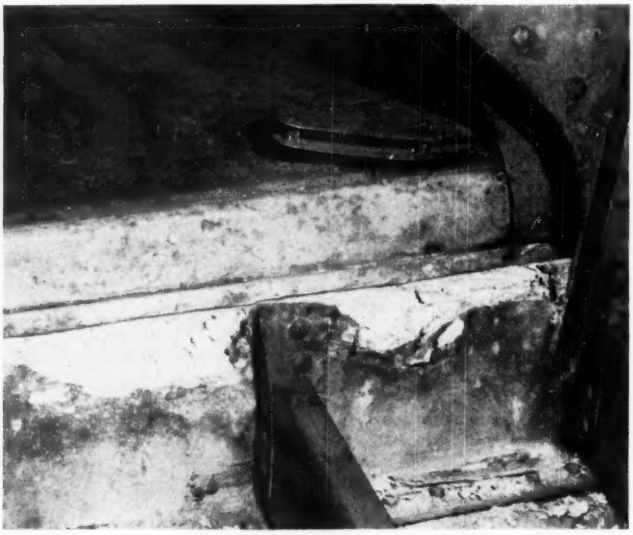


Illustration shows advanced corrosion of aluminum discovered in internal wing structure of surplus stored airplane. These areas were originally coated with zinc chromate primer, AN-P-656. *(Photo courtesy Northrop Aircraft, Inc.)*

GILBERT C. CLOSE, a newcomer to the pages of PRODUCTS FINISHING, received his training in engineering at the University of Minnesota, and for several years engaged in business enterprises and free-lance journalism.

At the outbreak of World War II, he joined the Process Engineering Staff of Douglas Aircraft Company, acting as an investigator and research man concerned with various metal handling, forming, treatment, and finishing problems. Later he was assigned the responsibility for all Process Publications issued to instruct foremen and operators in the various process operations in aircraft manufacture.

During 1945 Mr. Close worked under the supervision of the U. S. Navy Bureau of Aeronautics, writing technical orders and instructions for field maintenance of Naval aircraft equipment.

Gilbert C. Close

Since the war, with the exception of a short period of employment as a magazine publicity writer for a leading farm equipment company, Mr. Close has devoted his time to free-lance journalism. A member of the Aviation Writers Association, he has written altogether more than 1,000 articles on various phases of engineering, finishing, and manufacturing for nearly 100 scientific, engineering, technical, and popular magazines.

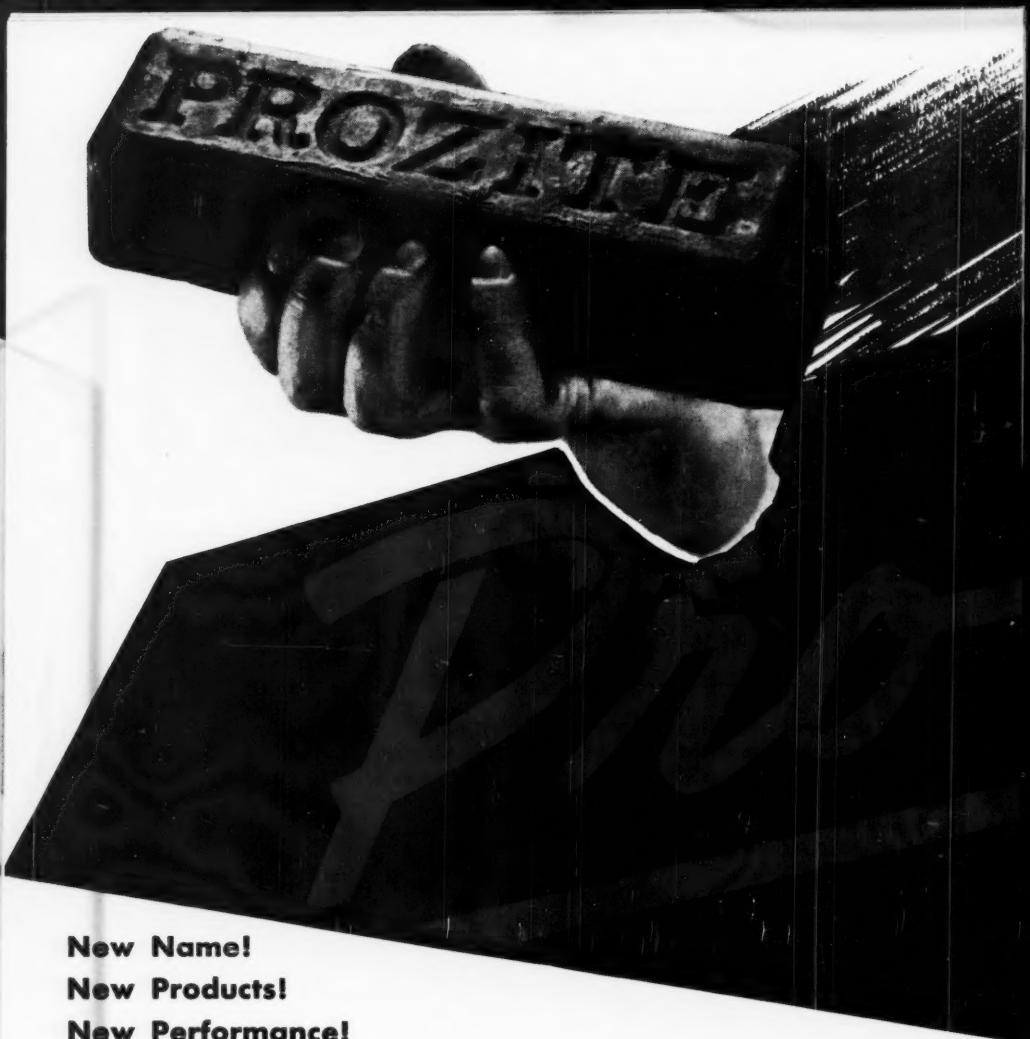
Further articles by Mr. Close will appear in forthcoming issues of PRODUCTS FINISHING.

process engineer, and conducted by K. B. Niles, process finish specialist, the tests proved beyond the realm of doubt that the alkyd resin addition to the conventional zinc chromate formula is a distinct improvement.

Despite wide and consistent use of zinc chromate primer for airframe protection, service reports continued to pour back from the field indicating that after a certain period of time, and under certain conditions, the protective value of the coating gradually disappeared. Analysis of these reports, along with inspection of the corroded airframe parts, indicated that zinc chromate primer was possessed of two distinct undersirable qualities. First, the coating would become water-sensitive, permitting moisture penetration and corrosion of the underlying metal. Secondly, a gradual decrease in adhesion resulted from prolonged exposure to moisture.

The first step Northrop engineers made to combat these conditions was to repaint all primed structures with a fast-drying synthetic resin to seal the porous primer coating. A clear synthetic alkyd resin having a medium oil content of not less than 45 per cent, and of an oxidizing type such as linseed or tung oil was used. Results from this repainting were very satisfactory, and solved the problem of corrosion of airplanes already in service. But this double-painting procedure on production parts, though effective, consumed more time and increased finishing costs.

The next logical step was to try mixing various percentages of the clear resin vehicle with the zinc chromate primer to get equivalent results. This necessitated a series of tests, not only to prove the value of the added resin, but to determine the correct mixing ratio, and to make sure that presence of the resin would not affect adherence of the basic zinc chromate primer to Specification AN-P-656.



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New Products!
New Performance!

WHAT IS PROZITE?

Prozite is a remarkable new abrasive material. Its outstanding characteristic is fine grain size presenting many more cutting edges for faster work and more mileage. Prozite compositions include entirely new bases and lubricants providing better performance, exceptional ease of cleaning and brighter color.

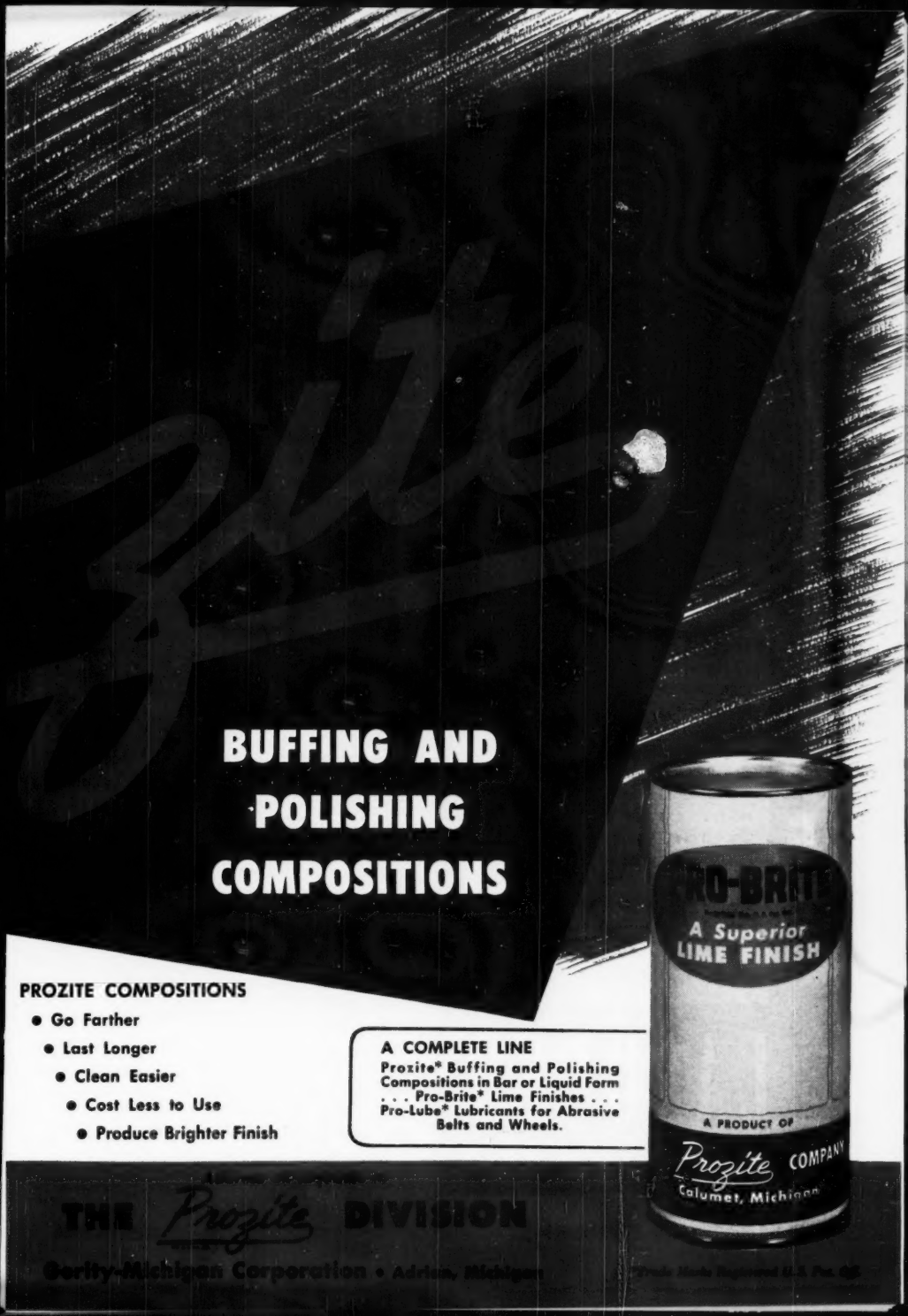
WHO IS PROZITE?

The resources of three major companies have been pooled to develop, manufacture, test and distribute the first totally new and better line of buffing and polishing compositions introduced in the history of the finishing industry.

1. POOR & COMPANY, Waukegan, Illinois — *research and development* of Prozite products in one of the finest and most complete laboratories in the finishing field.

2. CALUMET AND HECLA CONSOLIDATED COPPER COMPANY, Calumet, Michigan — *manufacturer* of Prozite products with gigantic bulk material handling and processing facilities.

3. GERITY-MICHIGAN CORPORATION, Adrian, Michigan — *exclusive national sales agent* for Prozite Compositions, and one of the largest metal finishers in the country. All Prozite products are shop-tested in this plant.



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Prozite* Buffing and Polishing Compositions in Bar or Liquid Form . . . Pro-Brite* Lime Finishes . . . Pro-Lube* Lubricants for Abrasive Belts and Wheels.

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Transparent lacquer coats inside and out The Hoover Company's nickel plated steel extension tubes ... protects surfaces from corrosion ... keeps them dollar-bright, lessens smudging.
Pigmented lacquer coats the Hoover crevice tool accessory, since it meets all specifications for hardness, durability and looks.
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HERCULES DOES NOT MANUFACTURE LACQUERS, ONLY THE DERIVATIVES FROM WHICH THEY ARE MADE.
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HELPS YOU SELL
CL50-9

A number of aluminum panels were prepared, using both the 24ST and 75ST alloys. Some panels were anodized; others were chromodized. Control panels were primed with conventional zinc chromate primer; test panels were primed with various percentage mixtures of zinc chromate primer conforming to Specification AN-P-656 and clear medium oil synthetic alkyd resin V40VP1 (Sherwin-Williams). Magnesium control and test panels, using FS-1h alloy, were prepared and primed in the same way, then further protected by coating them with gray enamel conforming to Specification AN-E-7. All panels were then subjected to 2300 hours of salt spray testing in accordance with Specification QQ-M-151a.

All aluminum panels primed with conventional zinc chromate primer showed the usual water marks after 2300 hours of exposure, indicating porosity and loss of adhesion. All panels primed with the zinc chromate-alkyd resin mixture were in perfect condition. The enameled magnesium panels, primed with zinc chromate and enameled, were totally corroded. The panels with the modified primer were corroded in spots, but were far superior to the panels with the conventional primer.

Of the mixtures tried, using zinc chromate conforming to Specification AN-P-656 and medium oil clear alkyd resin V40VP1, the following was found acceptable in all respects:

Ingredient	*Per Cent by Weight*
Total Non-Volatile	49½
Total Volatile	50½
Pigment to Vehicle Solids (Per Cent by Weight)	
Pigment	53
Vehicle	47

This mixture was adopted for use by Northrop Aircraft, Inc., and given the company finish specification number NAI-1071. The company name given the new product was Northrop Seal Primer No. 75.

Over and above the salt spray tests,

"Can't think of a better argument for 'Monel' Pickling Equipment!"

This pickling-room foreman is talking about "safety."

"Safety" that Monel* brings to pickling equipment.

Monel does not contain alloying materials which are eaten away by pickling acids, leaving only a crumbly, low-strength mass. (Such attack is known as "dezincification" or "dealuminumification".)

This deterioration goes on . . . but you don't see it.

The views on the left tell this story clearly. The lower 1"-diameter tie-rod has suffered dealuminumification to a depth of ⅛". *44% of the original area is useless!*

With Monel, this threat does not exist. In Monel you have the needed corrosion resistance as well as lasting strength and toughness. In Monel you get *extra safety!*

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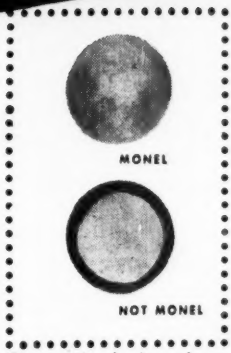


Cross-sectional view of two tie-rods after one year's service on a wooden pickling tank. Note how the Monel rod is unchanged, while dealuminumification has penetrated ⅛" into the other rod.

"PICK" MONEL FOR all types of pickling equipment. It can be fabricated to your needs out of economical, standard mill forms. For more information on Monel and Monel fabricators, write our Ray Reddell.

EMBLEM OF SERVICE INCO

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York 5, N. Y.

"MONEL*" Pickling Equipment means *Extra CAPACITY... Extra LIFE... Extra SAFETY*

the following tests were conducted to determine the characteristics of the new seal primer and its adherence to the requirements of Specification AN-P-656:

1. Water resistance test.
2. Weather resistance test.
3. Lacquer resistance.
4. Flexibility.
5. Aviation fuel resistance.
6. Separation.

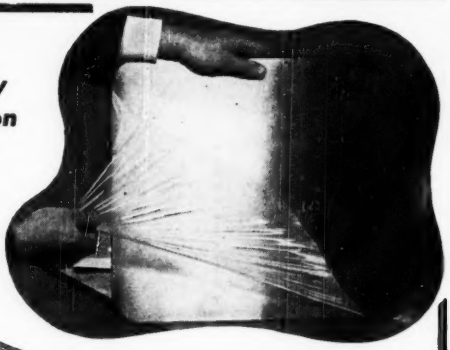
All tests were conducted under strict laboratory conditions, and followed applicable specifications. Control panels were used in each case, primed with zinc chromate, for comparison with the panels primed with the new Seal Primer No. 75 (NAI-1071).

In the water resistance tests, softening caused by moisture penetration was not evident when the new seal primer was used. The control panels exhibited the usual softening tendencies of zinc chromate. In the weather resistance tests, all panels were exposed for six months at a 45-degree angle facing the southeast. Here again the zinc chromate primed panels showed water streaks, while the panels primed with Northrop Seal Primer No. 75 were unaffected.

In the lacquer resistance tests, panels were coated with the seal primer and allowed to dry 10 minutes, one hour, 16 hours, and 48 hours respectively. In all cases the resistance to lacquer was satisfactory. In the flexibility tests, panels coated with Seal Primer No. 75 were bent double without rupture of the coating. One panel, after 2300 hours in the salt spray, was bent until the metal broke without peeling or loosening of the seal primer.

In all cases, the seal primer was completely resistant to aviation fuels. In separation tests, it was found that the Northrop Seal Primer does not settle as fast as zinc chromate primer, and that in 15 seconds it can be shak-

NEW **STRIPLASTIC now available for spray booth coat protection**



This new Striplastic Strippable Spray Booth Coating is shipped in a consistency so that it can be extended 20% or 30% by the addition of an inexpensive reducer. Ask us how.

THE STRIPLASTIC COMPANY

Among many advantages, it is non-toxic, possesses great tensile strength and is easily stripped off in one piece. Write for complete information on this new strippable plastic.

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UDYLITE PLATING EQUIPMENT KEEPS PRODUCTION ROLLING

Says Darnell Corp., Ltd.,
West Coast Caster Manufacturer
Casters and industrial rollers made by Darnell Corporation are plated by this Udylite Junior Full Automatic unit to give them longer life and lasting finish.

A YEAR AGO the Darnell Corporation, Ltd., Long Beach, California, faced a bottleneck in their plating department. Barrels of steel parts were stacked up, waiting to be plated. Since installing a Udylite Junior Full Automatic, they are able to keep up with production by operating the machine only part time. In addition, parts are now thoroughly cleaned, pickled and, after plating, given a dichromate dip to improve paint adhesion.

Like many other platers they have found their Udylite equipment and plating processes improve both the quality and the quantity of production and reduce direct labor costs.

Udylite offers a complete line of plating and metal finishing equipment for all plants. Trained engineers are available at all times for consultation with you concerning your plating problems. Call in your Udylite Technical Man today. No obligation.

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PIONEER OF A BETTER WAY IN PLATING

Representatives in Principal Cities

A Parco Cleaner costs you more per pound than your present metal cleaner. Yet cleaning economy—actual money savings—is reported from plant after plant, after changing to a Parco *Formulated* Cleaner.

Parco Cleaners are specially formulated to clean and condition metal surfaces for the next step in the finishing operation, to reduce cleaning time, operating temperatures and concentration of cleaner used. Surface area cleaned per pound of cleaner material is the basis of cost comparison of metal cleaning.

Try a Parco *Formulated* Cleaner. See if it doesn't save money for you, too.

- **Emulsion and Solvent Type**—Spray and immersion cleaners for removing oil, grease and soil from metal surfaces.
- **Acid Type**—Four cleaners for quick, effective removal of rust and scale from iron and steel.
- **Alkaline Type**—Light and heavy duty spray and immersion cleaners. For removal of oil, grease and soil from metal surfaces.

Bonderite, Parco, Parco Lubrite—Reg. U. S. Pat. Off.

Parker RUST PROOF COMPANY
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BONDERITE—Corrosion Resistant Paint Base • PARCO COMPOUND—Rust Resistant
PARCO LUBRITE—Wear Resistant for Friction Surfaces

en to spray without seediness and without producing areas lacking in color.

To substantiate the laboratory results, K. B. Niles says: "We have had approximately eight months' experience using this clear synthetic alkyd resin. The airframe structures which were painted with it over six months ago are in very good condition today, the material having been applied over zinc chromate primer which was failing at the time.

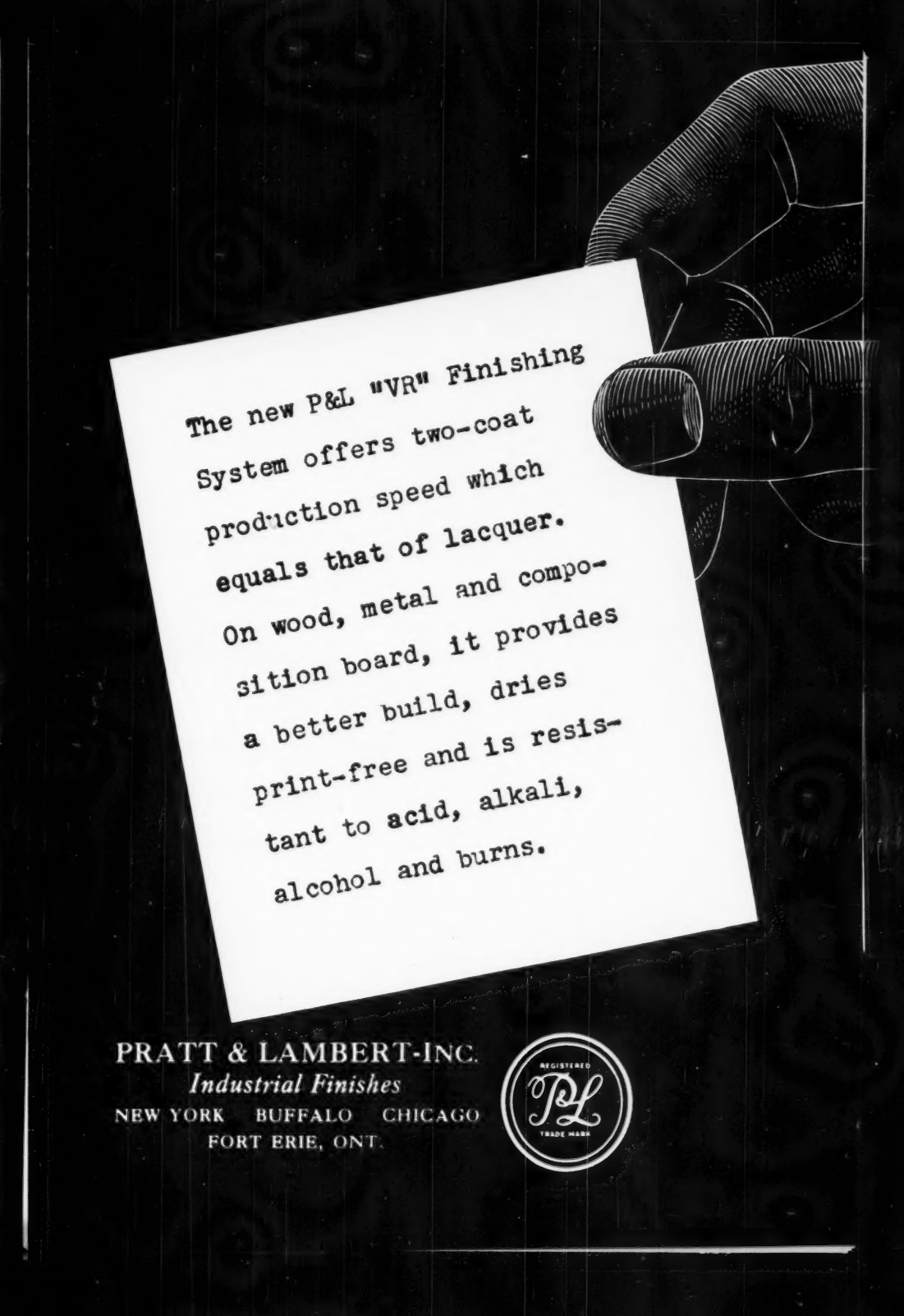
After a short-time use of the clear alkyd resin as an additional finish, various percentages of it were mixed with zinc chromate primer in order to cover certain unpainted structural parts with a suitable pigmented finish. These parts are also in a good state of preservation."

Northrop engineers point out that as it stands now, Northrop Seal Primer No. 75 meets all the requirements of Specification AN-P-656 while offering better service protection than zinc chromate primer only. Furthermore, the new product was blended with materials which are readily available from industrial paint manufacturers.

The results outlined above indicate conclusively that considerable improvement in the original zinc chromate primer has been made, and that great finishing advantages are gained from its use.

Gold From Industrial Waste Water

EVERY day, thousands of dollars worth of gold goes into the sewers along with the waste waters of the precious metals fabricating industry. According to Sam Tour, head of Sam Tour & Co., Inc., consulting engineers of New York City, this is a needless loss of gold and in many instances is the difference between profit and loss


The new P&L "VR" Finishing System offers two-coat production speed which equals that of lacquer. On wood, metal and composition board, it provides a better build, dries print-free and is resistant to acid, alkali, alcohol and burns.

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Industrial Finishes
NEW YORK BUFFALO CHICAGO
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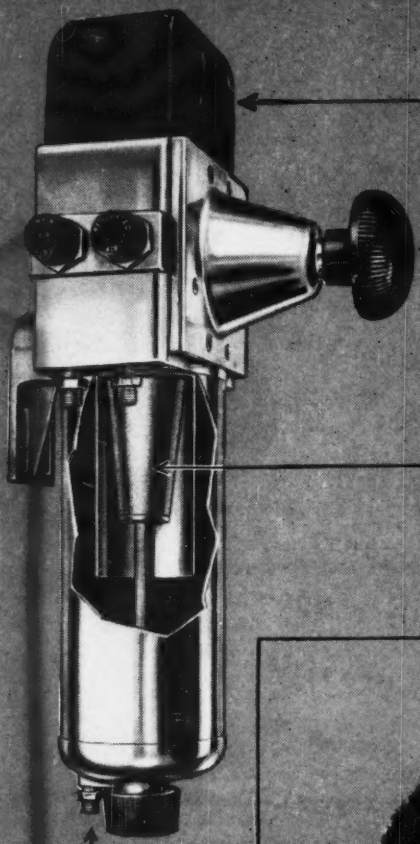


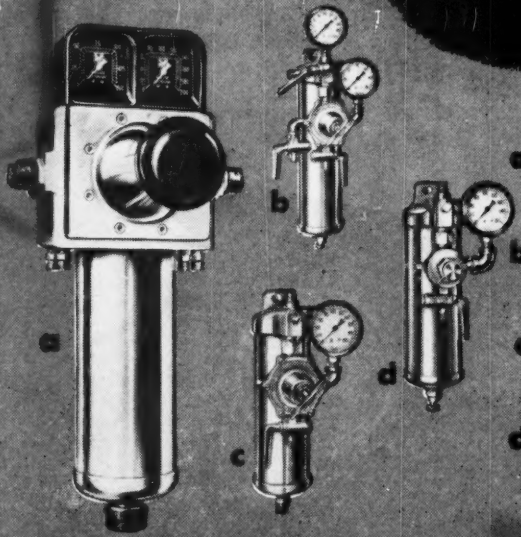
Clearly lettered, easy-to-read pressure gauges.

Large, easy-to-adjust, molded regulator knob. Selected pressure is accurately maintained.

Efficient, non-clog porous metal filter. Easily removed for cleaning. No filter packs to renew. No moving parts to wear out

Convenient semi-automatic drainage with valve for optional manual use.

BINKS oil and water extractors



a Model E75 Extractor—Ample capacity to operate several guns at one time. Supplies 75 cubic feet of clean, dry air per minute.

b Model 538A Extractor—Handles two or three guns at one time. Supplies 35 cubic feet of clean, dry air per minute.

c Model 545A Extractor—An inexpensive extractor furnishing ample clean, dry air for one gun of any model.

d Model AO-100 Extractor—A very inexpensive extractor supplying air for one Model 16, 15, 9, 9A or 8 spray gun.

EVERYTHING FOR SPRAY PAINTING

BINKS SPRAY SYSTEMS

STOP dirt, rust, oil, and water in your compressed air lines

- **Save time cleaning guns**
- **Obtain finer finishes . . . fewer rejects**

An essential ingredient of fine spray finishing is clean, dry air delivered to your spray guns at the right pressure. Though you may be using the highest quality paint, sprayed on a perfect surface with a top-quality Binks gun, you will not be applying the finest possible finish if your air is contaminated with foreign substances such as oil, water, dust, and rust. Since there is no known method of keeping these impurities out of compressed air lines, they must be trapped. This is best done with a Binks oil and water extractor between the compressor and the spray gun. The efficient porous metal filter in the Binks extractor removes all foreign materials.

Binks oil and water extractors not only supply pure clean air, but do so at the correct, unvarying pressure that you select. You adjust the spray gun but once. With correct pressures, there is no waste of expensive paint...the solvent is not dissipated in excess air but goes onto the surface with the pigment to produce a smooth finish.

A Binks oil and water extractor behind your Binks spray gun is the best and only guarantee of perfect finishing.

Pressure regulators and gauges are available as separate items for use where it is desired to regulate air pressure without cleaning the air.

"Binks equipment is designed to meet your needs—help you produce smooth, high-quality finishes, economically...every day."

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in manufacturing operations.

In the manufacture of rolled gold plate, watch cases, spectacle frames, high grade jewelry, dental gold inlays, gold dentures, costume jewelry, emblems, gold finished findings, and gold finished novelties, there are many pickling, washing, polishing, tubbing, cleaning and electroplating operations followed by washing operations. Fine particles of gold in suspension and considerable gold in solution go down the drains with the waste waters and solutions from these operations.

In some plants the drains go to settling basins in an attempt to catch the gold in suspension. Only the heaviest particles are caught in this fashion as the soap and cleaning agents in the waste waters prevent the finer particles from settling out. Only in a few instances where expensive filtering equipment has been installed are these finer particles caught. In most cases, they go down the sewer with the overflow from the settling basin. The value of the gold in this form in the waste water going into the sewer may be as high as $1.00 per ton of waste water.

Only in connection with gold electroplating operations does the industry make an attempt to recover the gold that is in solution. In most cases, this recovery attempt is limited to a rinse in water to be reused. In some cases, recovery is attempted by the use of "zinc boxes". Troughs or tanks are loaded with zinc shavings and the waste waters are percolated or allowed to flow through these boxes en route to the sewer. Ordinarily, such zinc boxes recover only 30 to 40 per cent of the gold in the waters and the balance goes down the sewer. Gold in this form going to the sewer may be as high as $3.00 per ton of waste water.

In cooperation with the Merrill Company of San Francisco, California, Sam Tour & Co., Inc. have adapted the patented Merrill-Crowe precipitation process for the treatment of waste waters in the plants of the precious metals fabricating industry. In this continuous automatic process, the waste waters are pretreated, clarified, de-aerated and the gold precipitated and collected in a form ready to be melted direct. A pilot plant for demonstration of the complete system and capable of handling about ½ ton of water per hour can be demonstrated in the laboratories of Sam Tour & Co., Inc. at 44 Trinity Place, New York City.

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ESTABLISHED 1856

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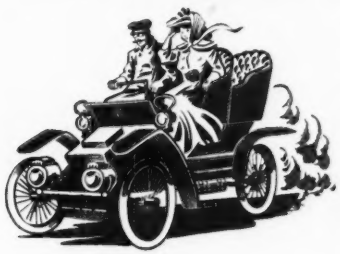

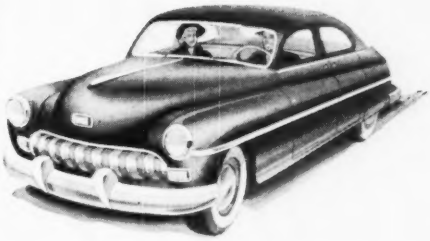

. . . . . TODAY!

In the duster and goggles era, automobile body painting was costly, time consuming, and inadequate. Not even a paint system of several coats could retard the formation of bond-destroying rust under the finish.

Today, however, a paint finish of outstanding durability and luster, offering maximum protection against rust, is obtained in a minimum of time and with a minimum expenditure of paint. This is accomplished by treating the sheet steel automobile body with "Granodine" prior to painting.

"Granodine" ®

changes the surface of pre-cleaned steel, iron and zinc surfaces into a smooth, crystalline coating of non-metallic zinc-iron phosphate that anchors paint, enhances luster, inhibits underpaint corrosion if the finish is damaged, and adds greatly to paint life and metal preservation.

"Granodine" can be applied by spray, dip, or brush.

"Granodine" protects the paint finish on automobile bodies and sheet metal parts, refrigerator and other cabinets, and, in general, products constructed of cold-rolled steel.

Granodized products are extra-value products. Be sure to tell your salesmen — your distributors — your retailers — and the public that your products are Granodized. Write us for further information.

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Spotlighting FINISHING Progress

Factors To Be Considered In Using Salt Spray Testing

By DR. ALLEN G. GRAY

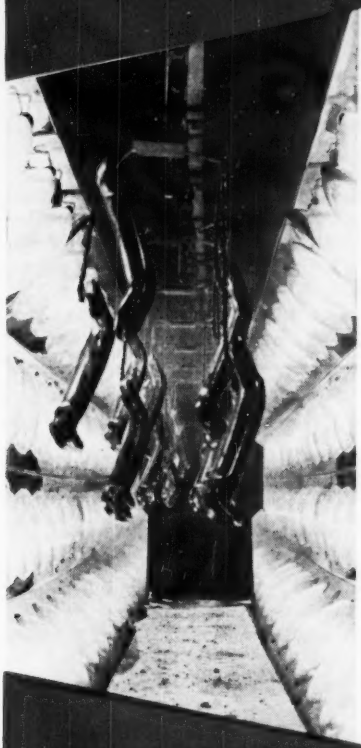
ACCELERATED testing of protective and decorative coatings for metal products has become increasingly important as the users of the various finishing methods better recognize the function and possibilities of the processes and materials employed. Despite the limitations of standard tests, there is at least one which—when employed with discretion—has proved of considerable value in accelerated testing procedures. This is the salt spray test. It is interesting to note that the salt spray test was first suggested in 1914 as a method of testing protective coatings on iron and steel to determine their probable performance in seacoast atmospheres. Extensive experience has shown that although this test yields results somewhat similar to those used in marine atmospheres, it does not reproduce all the factors that may be involved in marine service, much less under widely different conditions of exposure. Most technologists experienced in testing finishes for metal products consider the salt spray test as an arbitrary performance test. Its validity for a given coating depends upon the extent to which a correlation has been established between the results of the test and the behavior under expected conditions of service.

As usually specified, the salt spray test involves exposure of specimens to a fine spray or

A Monthly Digest of Current Technical Progress Indicating Significant Trends and Developments in the Finishing Industry

DEGREASING—PAINT BAKING

Both Done on One Conveyor Line with INFRA-RED Evenray SYSTEM



55% savings in production cost, at Automotive Stamping and Manufacturing Co. of Detroit, is typical of the advantages of a combined Infra-red degreasing and paint baking system. Here, the product moves on a conveyor through degreasing oven (3 minutes), on to paint dip tank, and then through baking oven (5 minutes). One man handles both placing and removing product on conveyor. For faster, better, lower cost production, Infra-red Evenray Systems provide astonishing utility and efficiency. Information on the experience of many plants is available for your consideration.

THE FOSTORIA PRESSED STEEL CORP.

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Oldest and Largest Manufacturers of Industrial Infra-red Ovens

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FOR BAKING • DRYING • PREHEATING • DEHYDRATING

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EXPERIENCE OF OVER 6,000 PLANTS PROVES FOSTORIA SUPERIORITY

- Lowest Unit Operating Cost.
- Most Uniform Heat Coverage.
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GET THE FACTS

Technical information and literature available on request. WRITE NOW. Learn how EVENRAY can aid your production.

mist of a solution of sodium chloride at a specified temperature. The fog particles settle upon the test surfaces, which are preferably inclined, and thereby constantly replenish and replace the film of solution on the surface. Generally, the extent and nature of the corrosion of the metal or coating after a specified period of exposure serves as a measure of quality. Adoption by A. S. T. M. in 1944 of a procedure specifying the conditions of the salt fog environment inside the test chamber, its calibration and maintenance, has contributed greatly to the uniformity and reproducibility of results obtained with the A. S. T. M. salt spray testing method B-117-44T.

More recently the results of studies conducted in the laboratories of the Parker Rust Proof Company by Van M. Darsey and Walter R. Cavanagh to determine some of the factors affecting results obtained from salt spray testing of finishes have been reported. Darsey and Cavanagh received the Sam Tour Award, at the annual 1949 meeting of the American Society for Testing Materials, for findings reported in this research which involved an investigation of the effect of such factors as type of apparatus, pH, rate of fog settling, air pressure, temperature, and specimen position, on the test results obtained. A procedure for producing a uniform wet salt fog in the test chamber and its measurement is a requirement for uniform results in salt spray testing.

Design of Salt Fog Cabinet

According to data presented by Darsey and Cavanagh, because of the difference in corrosion rate experienced in the operation of salt fog testing equipment at room temperature, a temperature of 95 + 2, —3 deg. F. was made a requirement of the test method. It was reasoned that it would be easier to maintain this temperature, which represents about the highest experienced in summer, than to provide cooling facilities to maintain

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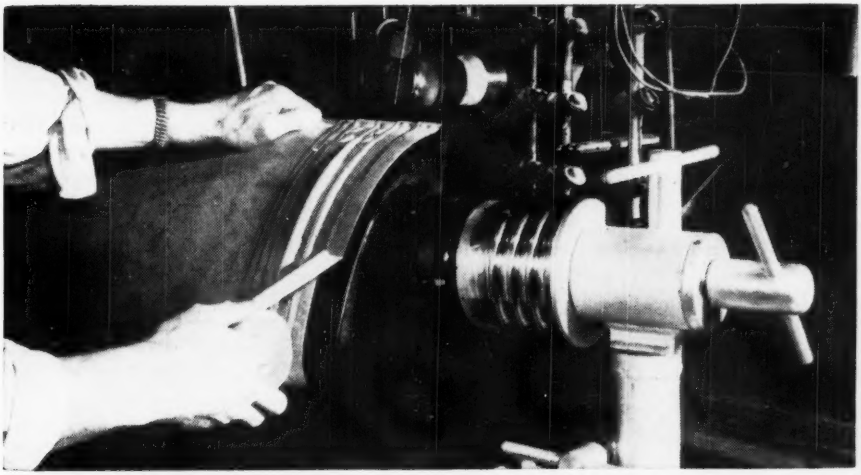
Available from your local paint dealer or write for name of nearest supplier.



MASKING PROPELLER HUB in the overhaul and maintenance shop at Northwest Airlines, Inc., with new, plastic-backed "SCOTCH" Pressure-Sensitive Tape No. 470. Note how tape clings tightly to curved surfaces—prevents "creep-under"—gives complete protection to machined areas. Pressure-sensitive tape is fast to work with because it goes on at a touch, whisks off cleanly when the job's done.

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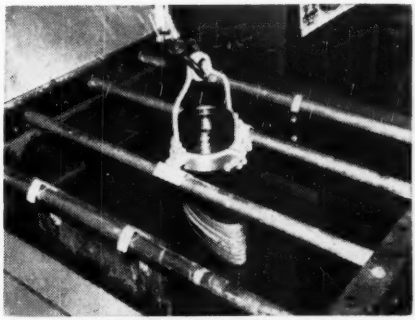

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the spray chamber at the temperature usually experienced from operation at room temperature in the winter months. It was emphasized that the maintenance of uniform temperature in the salt spray chamber is somewhat more difficult than generally believed. Several methods have been proposed; the principal ones are given below.

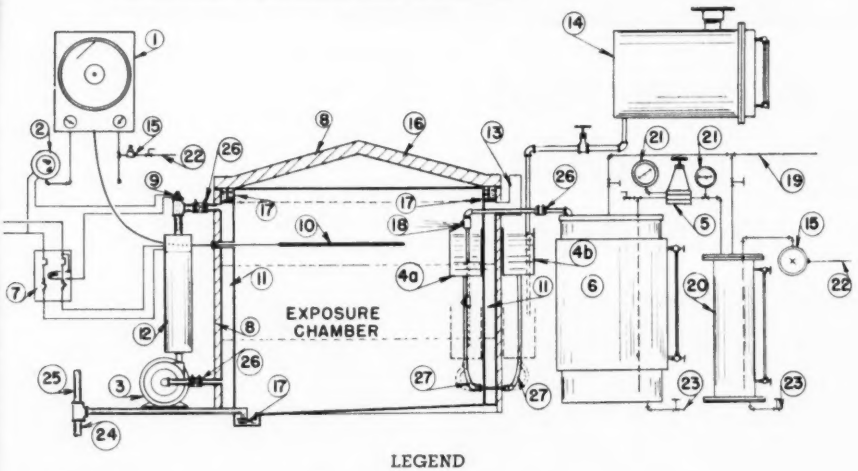
1. Provide a large room maintained at a temperature of approximately 95 deg. F. in which is located the salt fog testing apparatus. It was pointed out that this scheme, while capable of maintaining satisfactory temperatures, has the disadvantage of being inconvenient and uncomfortable at the time of inspecting and rating of specimens tested in the spray chamber.

2. Provide a water seal around the spray chamber in which the temperature is adjusted to maintain the inside of the chamber at 95 + 2, —3 deg. Fahrenheit.

3. Provide an air jacket around the fog chamber in which the temperature can be regulated to maintain the inside at the desired temperature.

One point brought out was that in maintaining the temperature of the

SALT FOG TESTING APPARATUS



LEGEND

(1) Temperature recorder controller for fog chamber
(2) Pneumatic switch
(3) Pump for continuously circulating water
(4) Adjustable constant level salt reservoirs: (a) Monel metal, (b) rubber-lined
(5) Air pressure regulator (Nullmatic)
(6) Saturator tower—thermostatically controlled
(7) Relay switch for heater
(8) Insulation
(9) Water limit thermostat
(10) Bulb for recorder controller
(11) Jacket for circulating water
(12) Water heater
(13) Vent on water jacket
(14) Rubber-lined salt reservoir
(15) Reducing valve
(16) Hinged cover
(17) Water seal
(18) Monel nozzle
(19) Water line
(20) Water scrubber
(21) Pressure gage
(22) Air line
(23) Drain
(24) To sewer
(25) Vent
(26) Rubber coupling
(27) Rubber tubing

Fig. 1—Diagram of salt fog testing apparatus used in studies conducted in Parker Rust Proof Company laboratories.
(Illustration courtesy Parker Rust Proof Co., Detroit 11, Mich.)

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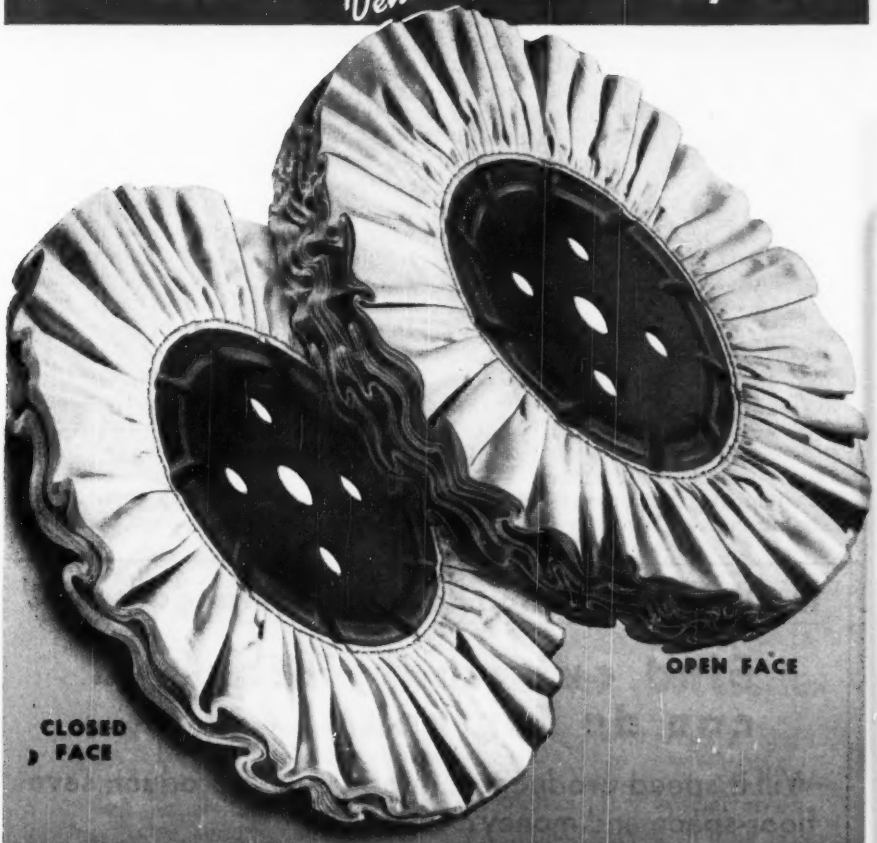

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salt fog chamber, it is necessary to prevent overheating the cabinet at any one location; otherwise moisture will be evaporated from the salt fog particles and salt deposited in such areas. In addition, such equipment makes it difficult to maintain the collected fog solution at the desired salt content.

After considering all the factors involved in salt fog testing equipment, Darsey and Cavanagh designed and built the apparatus shown in Fig. 1. In the test apparatus the exposure chamber is constructed of Monel metal with a water jacket around the four sides. The top is in the shape of an inverted V and is designed to permit any drops of salt solution to fall about ¼ inch from the sides, and not on the test pieces or into the water seal at the top of the chamber. The fog is vented through a water seal located at the bottom of the chamber.

The temperature of the test chamber is maintained by constantly circulating warm water through the water jacket. A pump is used to circulate the water, the temperature of which is maintained by a heater mounted on the discharge side of the pump. Both the pump and the heater are constructed of mild steel and are then connected to the Monel jacket by rubber couplings. The temperature is controlled and recorded by an air-operated recorder controller, the bulb being located in the exposure chamber. To prevent overheating the water when the box is open, and thus overheating the chamber after closing, a thermostat is mounted at the exit end of the heater to turn the heater off if the water exceeds 97 deg. F. Figure 2 shows an outside view of the testing apparatus. The temperature of this test cabinet is maintained between 95 and 96.5 deg. F. by the heating arrangement described.

In further describing their apparatus, Darsey and Cavanagh stated that

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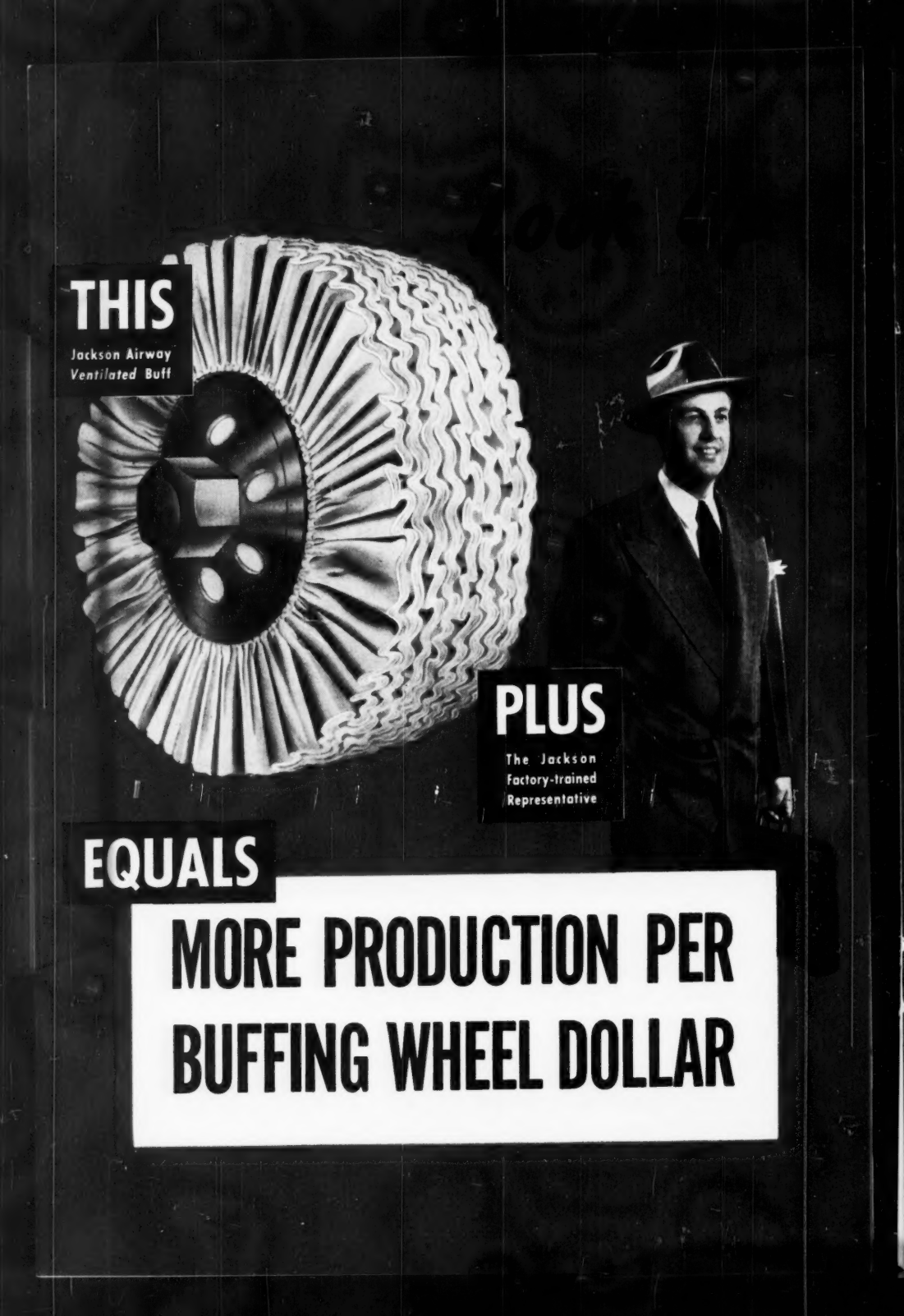
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the salt solution is stored in a Koroseal-lined tank which is sealed except for the discharge line. The salt solution is atomized by a Monel metal nozzle which can be located at any desired height in the chamber. Shown in Figure 3 is a cross-section of the Monel metal nozzle used to atomize the salt solution. The air is supplied at a line pressure of about 40 p.s.i. and is reduced to 25 p.s.i. by a diaphram-type reducing valve. At 25 p.s.i. the air passes a water scrubber to remove oil and dirt. The pressure is then adjusted to 10 p.s.i. by a Nullmatic pressure regulator. It was pointed out that this regulator was selected as one which, under these conditions, will maintain the air pressure within 1 mm. of mercury. The air is next saturated with water in the saturator tower and delivered to the nozzle.

Measuring Relative Rates of Corrosion

Darsey and Cavanagh pointed out that in order to measure the effect of various factors in the salt spray test,

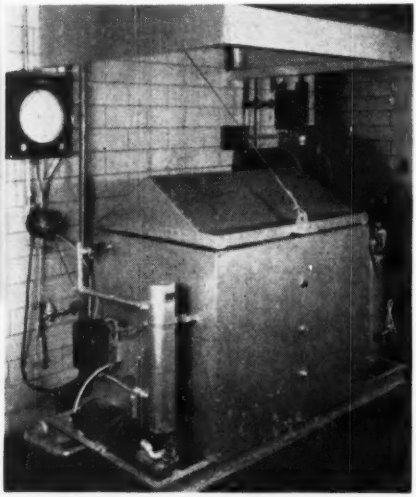

Fig. 2—Outside view of salt fog testing apparatus.
(Photo courtesy Parker Rust Proof Co., Detroit II, Mich.)

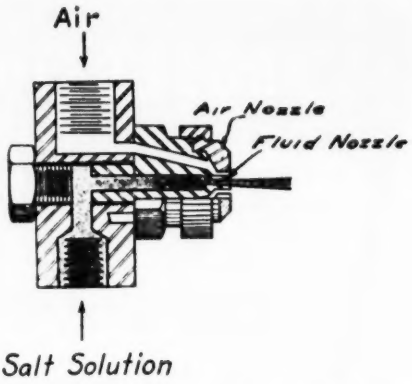

Fig. 3—Cross-section of Monel metal nozzle used to atomize salt solution in test chamber.
(Illustration courtesy Parker Rust Proof Co., Detroit II, Mich.)

it was first necessary to establish a means of measuring corrosion. Throughout the study, the weight loss in mg./sq. cm. of a steel panel when exposed to the salt fog for 24 hours was used as a measure of its corrosiveness. The panels for test were cleaned by washing in mineral spirits followed by vapor degreasing in trichlorethylene. After cleaning, the panels were weighed and the backside coated with a heavy rust-preventive compound to protect it from the salt fog. The panels thus prepared were exposed for 24 hours at 15 degrees off the vertical in the salt fog chamber with the uncoated side up. At the end of the exposure period the test panels were water rinsed, dried, and vapor degreased to remove the rust preventive material. The corrosion products formed on the panels by action of the salt fog were removed by immersing the panels in a stripping solution consisting of 100 parts by weight of concentrated hydrochloric acid, 2 parts of antimony trioxide, and 5 parts of stannous chloride. The panels were then water rinsed, dried, and re-weighed. The weight loss per sq. cm. was calculated, and this figure used to represent the corrosiveness of the salt fog.

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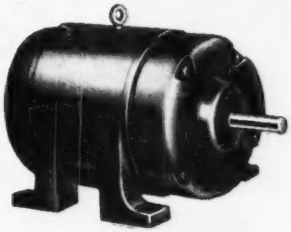

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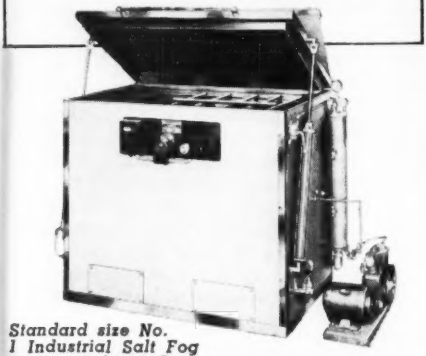

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Effect of Temperature and Specimen Position on Corrosiveness

The above technique was applied in determining the difference in corrosion rate at room temperature and 95 deg. F., and also in studying the effect of position of the panels at these temperatures. Painted panels were exposed to salt fog with a collection rate of 0.5 to 1.0 ml./hr. This collection or settling rate was determined by collecting a sample of the fog in a 10 cm. diameter funnel inserted through a rubber stopper into a 100 ml. graduated cylinder and expressed as ml. collected per hour. In conducting the test, panels were exposed vertically and at 15 degrees off the vertical, with the temperature controlled at 95 deg. F. and at 72 deg. F. (room temperature).

Two different paint systems were used in the test, one being a two-coat refrigerator finishing system, and the other being a two-coat black enamel system. All panels were scratched through the paint to the base metal before exposure to the salt fog. The paint creepage was determined by removing any paint which could be blown off by compressed air at 30 p.s.i. and measuring the greatest distance from the scratch to paint film which remained intact. Three groups of painted panels were tested, one at 95 deg. F. in the salt spray room, one at 95 deg. F. in the 25 cu. ft. cabinet, and a third at 72 deg. F. in the 25 cu. ft. cabinet. Half of each group were exposed at 15 degrees off the vertical in Micarta racks and the remaining panels were exposed vertically by suspending them on strings. The corrosiveness of the salt fog was checked twice a week by means of bare steel panels exposed in groups of three.

The results showed that the average corrosiveness was lowest in the cabinet at 72 deg. F. and highest in the cabinet at 95 deg. F. With reference to creepage, least was found in the cabi-

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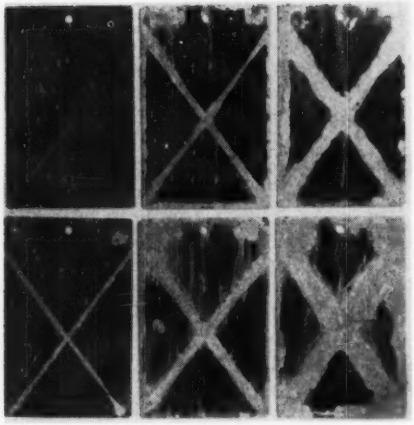

Exposed 72 deg. F.; in cabinet | 95 deg. F.; in room | 95 deg. F. in cabinet

Fig. 4—Test specimens illustrating effect of temperature and specimen position on paint creepage of panels finished with a two-coat black enamel after 500 hours' exposure in salt fog test. Phosphatized steel. Top row suspended vertically; bottom row 14 degrees off vertical. *(Photo courtesy Parker Rust Proof Co., Detroit 11, Mich., and based on a technical paper presented before the 51st Convention of the A.S.T.M.)*

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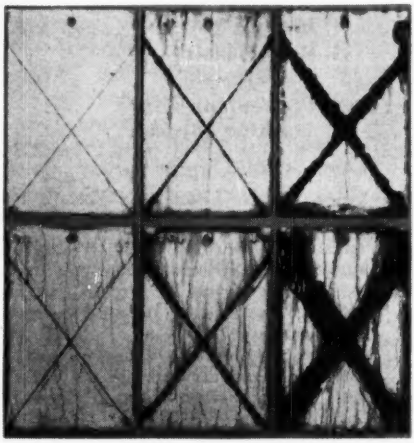
pH of Salt Solution

Extensive studies were conducted on the effect of pH of the salt solution on results obtained in the corrosion tests. It was concluded that to maintain constant conditions in a salt fog chamber at 95 deg. F., the pH should be adjusted to produce a fog which has a pH between 6.5 and 7.2. This can be accomplished by adjusting the pH of the salt solution to 6.5—7.2 while it is maintained at 95 deg F., or by adjusting the pH at room temperature until a sample has a pH of 6.5—7.2 after being gently boiled for 30 seconds. In salt fog chambers where the salt solution is contained within the fog chamber at 95 deg. F., no difficulty should be encountered if the solution is allowed to reach equilibrium before adjusting the pH. In connection with pH adjustment, it should be remembered that the pH of a salt solution saturated with air rises as the temperature increases, due to the lowering of the solubility of carbon dioxide in the solution.

Effect of Air Pressure

Darsey and Cavanagh pointed out



Exposed 72 deg. F.; in cabinet | 95 deg. F.; in room | 95 deg. F. in cabinet

Fig. 5—Test specimens illustrating effect of temperature and specimen position on paint creepage in salt spray testing. Top row suspended vertically; bottom row 15 degrees off vertical. Phosphatized steel panels finished with two-coat refrigerator enamel after 500 hours' exposure to salt fog test. *(Photo courtesy Parker Rust Proof Co., Detroit 11, Mich., and based on a technical paper presented before the 51st Convention of the A.S.T.M.)*

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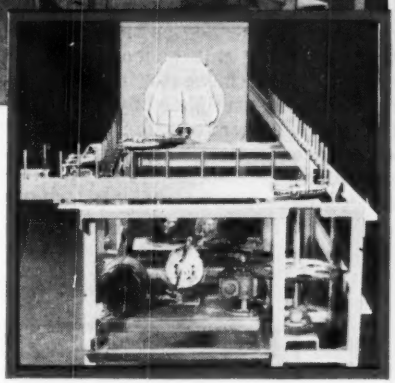

Manufacturing breather caps for oil filler pipes was nothing new for this manufacturer—he'd been doing it for years—had even rigged up an infrared oven of sorts which did a "good enough" job of baking a final finish. That was before production demands doubled, finish specifications became more critical and sizes began varying.

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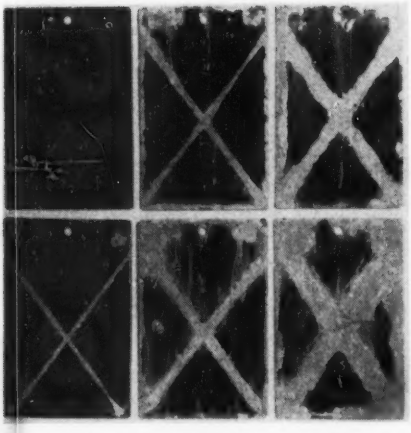

Exposed 72 deg. F.; in cabinet | 95 deg. F.; in room | 95 deg. F. in cabinet

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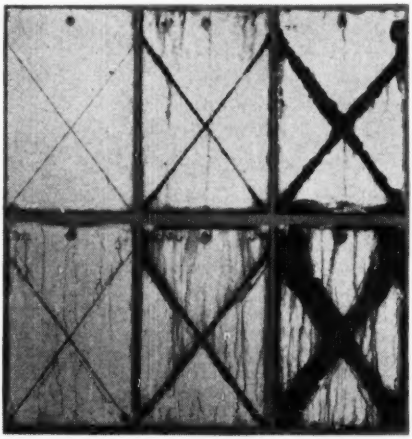

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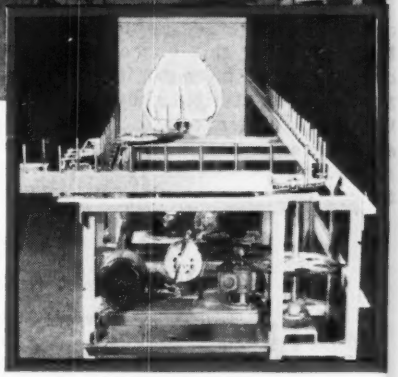

Manufacturing breather caps for oil filler pipes was nothing new for this manufacturer—he'd been doing it for years—had even rigged up an infrared oven of sorts which did a "good enough" job of baking a final finish. That was before production demands doubled, finish specifications became more critical and sizes began varying.

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that their experiments showed the existence of certain critical pressures at which abnormal increases in the corrosiveness of the salt fog were noted when fluctuations in the air pressure occurred. These critical pressures appear to be related to the size of the fluid orifice and independent of the size of the air orifice. An important fact is that such increases in the corrosiveness of the fog can be avoided by controlling the pressure to avoid fluctuations greater than $\pm$ 0.1 p.s.i. or by using pressures above or below the critical pressure, providing the critical pressure of the nozzle being used is known.

Effect of Salt Fog Collection Rate on Corrosion

It was found that the corrosiveness of the fog increased as the fog collection rate and salt concentration decreased. This increase in the corrosiveness was attributed by Darsey and Cavanagh either to the decrease in the salt concentration in the fog or the decrease in the collection rate. The limits for fog collection specified in A.S.T.M.

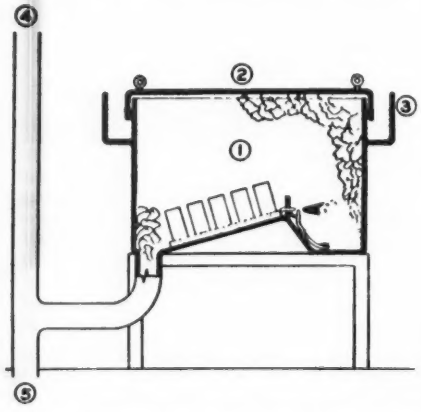

Fig. 6—Diagrammatic sketch of salt spray box used at National Bureau of Standards: (1) exposure chamber, (2) removable cover, (3) water seal, (4) vent, (5) sewer outlet. *(Illustration courtesy "Corrosion Handbook")*

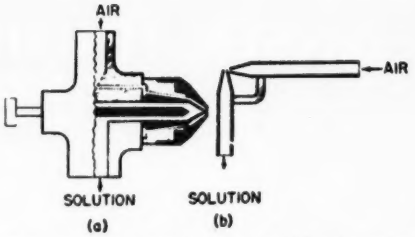

Fig. 7—Types of nozzles used for the salt spray: (a) high pressure Monel metal nozzle, (b) low pressure glass nozzle. *(Illustration courtesy National Bureau of Standards, Washington 25, D. C.)*

B-117-44T are 0.5 to 3.0 ml./hr.; it was concluded that variations in the collection rate within the limits of this method do not affect the corrosiveness of the salt fog.

Other Salt Spray Test Equipment

Although it is not necessary to specify the exact apparatus to be employed in salt spray testing, certain features are essential. Figure 6 shows a diagrammatic sketch of the salt spray box used at the National Bureau of Standards as described in the recent "Corrosion Handbook," published by the Electrochemical Society (John Wiley & Sons). The spray or fog is produced by blowing humidified air through an atomizer so that the solution is converted into a stream of fine particles. The nozzles may be made of glass, hard rubber, plastic, Monel or other corrosion resistant metals. Sketches of typical nozzles are given in Fig. 7.

Work at the Bureau of Standards indicates that if the salt spray, as produced, is allowed to impinge directly on the specimens, marked localized effects on corrosion may result from convection currents or from the presence of relatively coarse and more rapidly settling particles in the spray. Greater uniformity in testing is obtained by directing the spray against baffles, on which the larger particles condense. In Fig. 6 the end of the

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Fig. 9—An electrographic four-print series of a bare steel panel having one coat of a commercial, heavily extended, semi-gloss paint after 48 hours' exposure in the salt fog test. Tests were conducted in Dr. Kronstein's laboratories, New York University.
(Illustration courtesy American Chemical Society)

box serves as a baffle and at the same time returns to the reservoir about 75 per cent of the sprayed liquid in an uncontaminated state. Shown in Fig. 8 is one type of commercially available salt fog testing apparatus.

Salt Concentration

According to the Bureau of Standards Report the salt spray test is generally conducted with a 20 per cent solution of sodium chloride, although lower salt concentrations have been used. The oxygen solubility of the 20 per cent solution has been reported to be less affected by temperature than a solution of lower salt concentration. Darsey and Cavanagh in the previously mentioned report stated that the use of a salt fog containing more than 22 per cent salt results in less paint creepage than when a fog containing 18-22 per cent salt is used.

Following the Progress of Salt Spray Corrosion Tests

Work has recently been conducted at New York University under the direction of Dr. Max Kronstein which indicates that the electrographic test method is useful for evaluating the changes in test panel conditions before and after exposure to the salt fog corrosion conditions. In such a system of evaluation, the panels are printed before the beginning of the test and again 48 hours later, and at later periods. This combination of the electrographic test with salt fog exposure appears to be a fast and convenient method for development work on new coatings. Most finishing technologists and development engineers realize the need for at least preliminary test results on new coatings in a fast sequence. The work carried out by Dr.

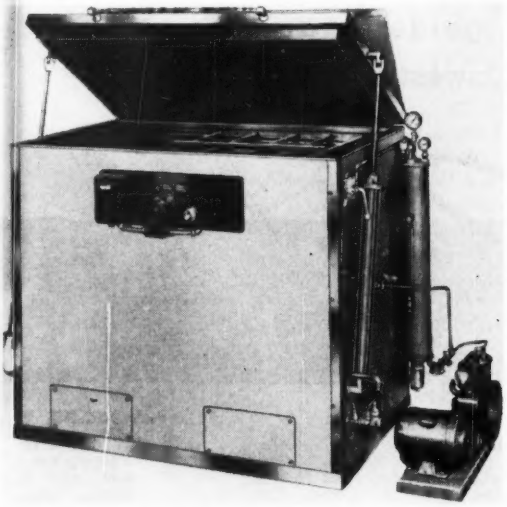

Fig. 8 — One type of commercially available salt fog corrosion test apparatus.
(Photo courtesy Industrial Filter & Pump Mfg. Co., Chicago 12, Ill.)

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Kronstein has shown that a set of electrographic prints together with a 48-hour salt fog exposure and a repeated set of prints gives such data relatively easily.

Fig. 10—Testing the effect of a reactive pigmentation on a binder using salt fog followed by electrographic test. In the above electrographic prints made in Dr. Kronstein's laboratories, the binder alone has been applied to a bare steel panel, cured for 45 minutes at 110 deg. C., and exposed in the salt fog cabinet for 48 hours.
(Illustration courtesy American Chemical Society)

Shown in Fig. 9 is an electrographic four-print series of a bare steel panel having one coat of a commercial, heavily extended, semi-gloss paint, after 48 hours' exposure in the salt fog cabinet in Dr. Kronstein's laboratory. Figure 10 and Figure 11 illustrate the application of the method of testing the effect of a reactive pigmentation on a binder. Figure 10 shows electrographic prints on bare steel panels to which the binder alone has been applied, followed by exposure in the salt fog cabinet for 48 hours. Figure 11 shows electrographic prints wherein the binder was combined with a reactive pigment, applied as paint on bare steel panels and baked for 45 minutes at 110 deg. C. The prints shown were made after exposure in the salt fog chamber for 48 hours.

Making Electrographic Prints

The method of making electrographic prints utilizes a regular Carver Laboratory press. The printing is done between the two plates of the press. The test panel is located between two electrodes which are insulated by Neoprene sheets from the press itself. Batteries or some other suitable source of direct current should be available. The setup is shown diagrammatically in Fig. 12. Prints are made on Kodak imbibition paper; also, Defender paper, backing B. F., can be used successfully. Blotting paper was used as an additional source of the electrolyte which was 5 per cent potassium nitrate. After soaking for ½ hour, the papers were pressed at 550 p.s.i. following which the test panel was set on the anode plate. The imbibition paper with the glossy side on the paint, was set over it, the blotting paper on this, and in turn the cathode electrode was placed on this. This setup or "sandwich" was placed between two sheets of Neoprene to insulate it from the press itself.

The electrode plates in the tests were aluminum plates with connecting

Fig. 11—The same technique was applied here as in Fig. 10; however, in this case the binder was combined with a reactive pigment.
(Illustration courtesy American Chemical Society)

rods for the electric current. The prints were made under a pressure of 600 p.s.i. and the period of pressure

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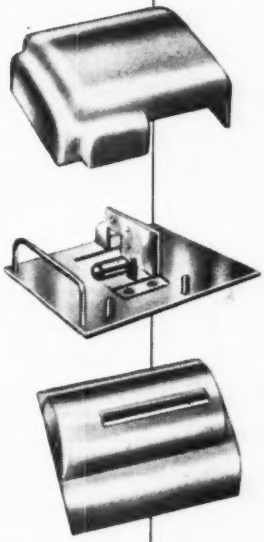

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with voltage was standardized at 15 to 20 seconds. The voltage used was 6 volts. Following this treatment the paper retaining the ferrous and ferric ions was removed from the press and developed in a bath containing 25 g./l. each of potassium ferrocyanide and potassium ferricyanide. After 30 minutes in this solution, the prints were removed, washed in warm water until the yellow color of the ferrocyanide had been removed, and dried. The details regarding development of the electrographic test method and the results obtained in a number of applications were described by Dr. Kronstein at the Washington and Atlantic City meetings of the American Chemical Society.

As can be noted from photographs of test panels exposed to salt fog conditions, to assist in testing the underfilm corrosion characteristics, panels are given a fine knife cut in the form of an "X" before exposure. Indications are that this method of following salt fog corrosion progress can be applied to other base metals, by choosing proper reagents for developing the ions dissolved from the surface during the testing process.

Plated Coatings

The salt spray test is one of the oldest and one of the most widely used methods for judging the quality of plated coatings. For the most part, insofar as plated steel and die castings are concerned, it is considered to be essentially a porosity test. In spite of improved methods and standardization, its use has been discontinued in A.S.T.M. plating specifications as a test for judging zinc and cadium plated parts. The use of an acetic acid salt spray for testing of plated zinc base die castings has been proposed by C. F. Nixon, based on work conducted at Ternstedt Division, General Motors Corporation. The solution recommended consists of 1 per cent acetic acid and 20 per cent sodium chloride at a temperature of 120 ± 5 deg. F. When used in the regular salt spray apparatus the solution was reported to produce the type of failure occurring in service.

Plated Coatings on Aluminum

In discussing plated coatings on aluminum at the Annual 1949 Convention of the American Electroplaters' Society Fred Keller and W. G. Zelley, Aluminum Research Laboratories, brought out the fact that the salt

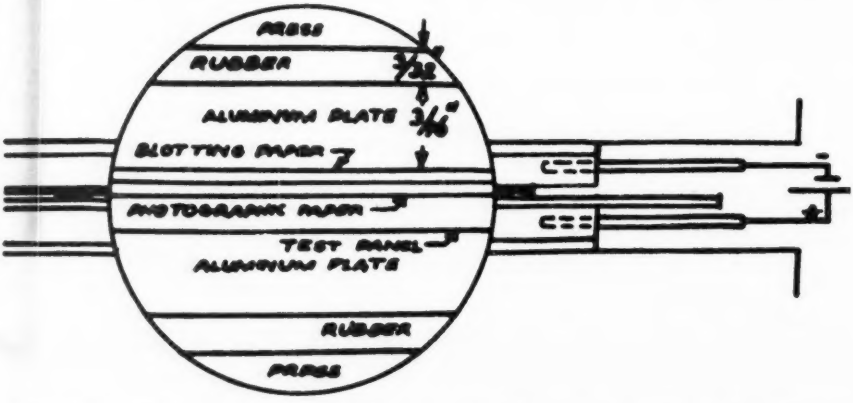

Fig. 12—Diagram of apparatus used by Dr. Kronstein's laboratory for making electrographic prints of test panels exposed to the salt spray test.
(Illustration courtesy American Chemical Society)

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spray test is used for rapid evaluation of the quality of plated coatings on this base metal. The plated aluminum test panels are prepared for testing by machining two grooves about 1/32 inch deep with a V-shaped threading tool on a shaper in such a manner as to form an "X" pattern. These grooves extend through the plating and expose a portion of the aluminum alloy base.

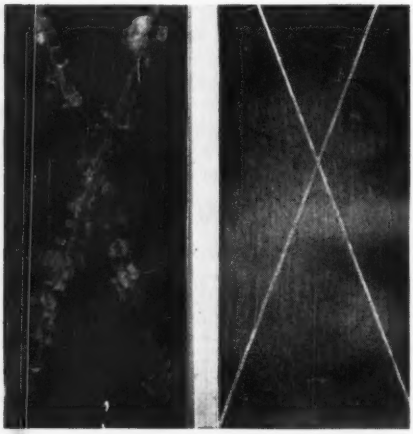

Fig. 13—Application of the salt spray test to testing of conditioning treatments and plating practices on copper-nickel-chromium plated aluminum panels. Both of these samples were exposed to 300 hours' salt spray test in the Aluminum Research Laboratories. It was reported that sample (a) was plated with a hard, stressed nickel deposit and sample (b) with a soft and ductile nickel deposit.
(Photo courtesy American Electroplaters' Society)

When specimens of this type are subjected to salt spray, any plating that is inadaquate, or that has not been satisfactorily applied, will soon develop blisters and will lift along the sides of the grooves. Samples prepared by good surface conditioning treatments and plated in purified and clean nickel solutions have been reported to withstand 300 hours' exposure in the test without any indication of failure, while some samples have been reported to withstand 750 hours' exposure satisfactorily. An example of the type of result obtained in salt spray tests with these grooved samples is illustrated in Fig. 13, which shows two plated 24S-T4 samples after 300 hours in the salt spray test in the Aluminum Research Laboratories. Both of these samples were prepared by the zinc immersion procedure and had coatings of 0.0003 inch copper, 0.002 inch nickel, and 0.00002 inch chromium. Two different nickel plating solutions were used, one of which gave a hard, highly stressed nickel plate and the other a soft ductile nickel plate. The former sample was reported to develop stress cracks early in the test, and corrosion started at these cracks, while the latter sample showed only a small amount of lifting along these grooves, as can be seen from the photograph in Fig. 13. This illustrates the application of the salt spray testing method to a study of difference in performance of samples having the same thickness of plating, and same base metal, but made by different plating procedures.

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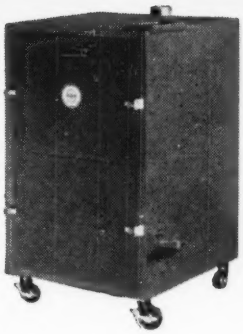

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MANUFACTURERS engaged in metalworking where finishing operations are involved, are reporting favorable results from the use of infra-red systems for metal degreasing and paint baking. This method permits the adoption of a conveyor system for the complete finishing operation, including degreasing, spraying, baking, cool down and final assembly or packing.

How It Works

The average reader who is not acquainted with the operating characteristics of infra-red immediately asks, "How does it work?" How can a little infra-red heat remove grease? Heat is the answer, but it takes more than just a "little." Infra-red degreasing requires product temperature of approximately 550 deg. F. At approximately that temperature the grease on the metal is carbonized and the largest percentage of the carbonization is carried off with the smoke and fumes through the use of an overhead ventilation system. Someone else might ask, "Is there any flame present during the operation?" The answer is "No."

The average time required for infra-red degreasing is 2½ minutes. A little extra conveyor time must be allowed for the product to cool down if painting or assembly operations are involved. A large fan can be used to help cool down the product after it emerges from the degreasing oven.

Because of the intensity of heat used in an infra-red degreasing oven, and the short time cycle, such ovens are

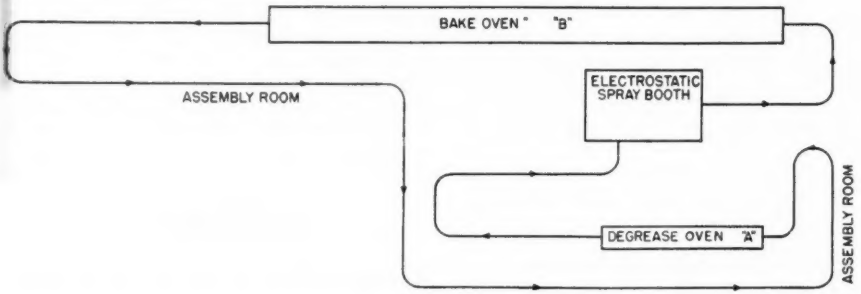


Fig. 1—Sketch showing floor plan of degreasing, painting, and baking setup at the Barcalo Manufacturing Co., Buffalo, New York

usually relatively small in size and occupy small floor areas.

Possible Applications

Any metal-working plant that does degreasing and finishing should investigate the possibilities of infra-red degreasing. However, it is a foregone conclusion that a qualified infra-red engineer will turn down many products as unfit for infra-red degreasing. The method was never intended as a cure-all for degreasing problems, or meant to compete with all chemical degreasing systems.

Cases have been found where an infra-red degreasing system was the only one that could be honestly considered as satisfactory because of certain characteristics of the product itself. One example cited is that of tubular products closed on both ends but with holes or perforations between the extremes. Obviously, with a chemical degreasing system the liquid would fill the tube and require draining; all of which would require time and labor, or a special handling system.

Flat or slightly contoured sheet metal surfaces are generally considered the best shapes for infra-red degreasing. Products with deep crevices or areas that cannot be radiated directly by the infra-red rays are generally considered unlikely prospects for infra-red degreasing. However, the only way to determine definitely the possibility of utilizing infra-red for degreasing is to submit the product for test. If a uniform temperature of approximately 550 deg. F. can be reached in the product, then infra-red degreasing can usually be employed.

It is only logical for someone to wonder if there is a problem of distortion in a metal product when elevated temperatures are employed for removal of grease. Actual experience has shown that assembled products, such as sheet metal boxes or cabinets, do undergo some distortion during the heating period, but revert to the proper shape during the cool down period. Apparently, the distortion problem is one that occurs only in box-shaped products when light gauge metal is used.

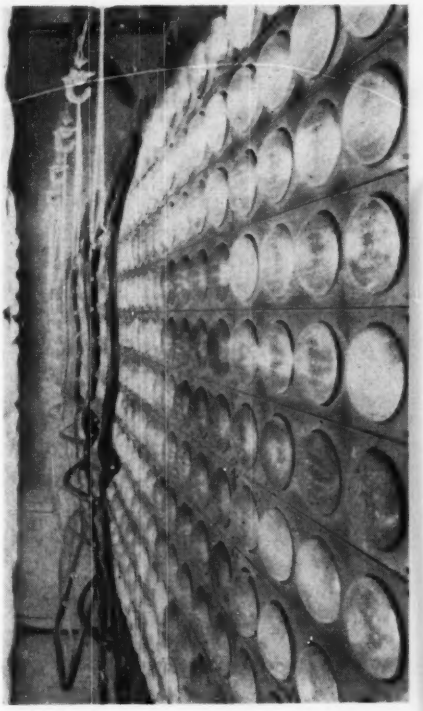


Fig. 2 — At Barcalo, folding chair frames are conveyed through an infra-red oven so that the grease may be burned off by the heat of the lamps.

Some types of extremely heavy drawing compounds also present a problem for infra-red degreasing, but here again the answer can only be determined by submitting the product for test.

What about residue left on the product after coming from the infra-red degrease oven and removal of the same?

First, the amount of residue left on the product depends on the type of oil or emulsion used on the metal. A light

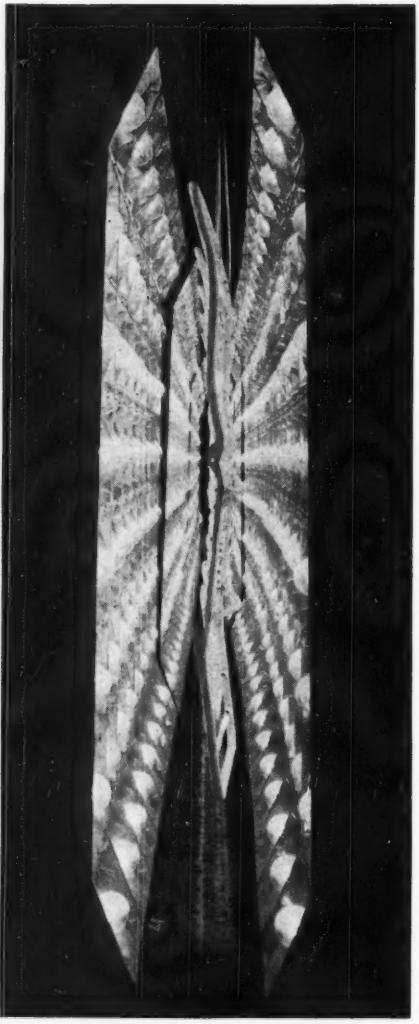


Fig. 3 — After chair frames are sprayed with paint in an electrostatic spray booth, they are baked in an infra-red oven at the Barcalo plant.

coating may burn off so completely that any amount left may be negligible, or easily removable by a blast of air or hand wiping. Removal of small remaining residue depends somewhat on the product and finish standards; also the thickness of the paint film.

It is believed that small amounts of residue left on the surface may be absorbed by the paint if applied in a heavy coat without showing any roughness after the finish is baked.

When a manufacturer using an infra-red degreasing system decides in favor of hand wiping for removal of small amounts of residue, it is usually found that the job can be done quickly at low cost, and, that the cost is offset in other savings that accrue to the system as a whole.

Advantages of the Method

When a manufacturer does all finishing operations on a product and finds that it is possible to use infra-red for degreasing, then he is in excellent position to use a completely conveyorized setup for all finishing operations.

Once the product is ready for the finishing room, handling can be reduced to a minimum from there on. Products can be put on the conveyor for consecutive operations of infra-red degreasing, cool down, spraying (manually or automatically), paint baking, cool down, packing or final assembly.

When infra-red can be employed for degreasing, it results in the following advantages:

1. Increased speed
2. Lower cost
3. Little floor space
4. Complete conveyorization
5. No water or steam fumes

Typical Installations

A common adage is "The proof of the pudding is in the eating." And of course the merits of any industrial process lie in advantages to its users.

Barcalo Mfg. Co. at Buffalo was one of the first concerns to use infra-red for degreasing as well as paint baking for their product finishing operation. This company manufactures an adjustable chair, using tubular steel for the frame. Here was a case where a chemical degreasing system presented

the problem of extra handling and so on for draining the liquid from the tubes. Figure 1 shows the floor plan for all finishing operations at Barcalo. Figure 2 shows an end view looking into the infra-red degreasing oven. The temperature of the frames going into the spray operation is 145 deg. F. and it is reported that this elevated temperature causes excellent adhesion of the paint to the metal.

Degreasing time here is 2½ minutes. Baking time for the finish in the larger infra-red oven is 8½ minutes (see Fig. 3). Removal of any residue by hand wiping is not resorted to at Barcalo. White enamel is used and an excellent job is achieved.

Lee Metal Products at Baltimore, Maryland, presents another case for inspection. The company manufactures a line of utility cabinets, in a range of sizes 12 x 18 inches to 24 x 36 inches and some of them 66 inches high.

An industrial management engineer visited recently at the Lee Metal Products factory to inspect the infra-red degreasing oven in particular. He had the following to say in an unsolicited letter: "I had some special pride in seeing this operation because almost from the inception of infra-red lights in industry, I have suggested that they might be useful in degreasing metal. I was very much impressed with the effectiveness of this method as used at Lee Metal Products. Little floor space is required, and conveying of material and parts through the oven is a simple, rapid operation. Degreased parts are immediately ready for the paint booth except for a quick wipe-off of the residue."

The degreasing time at Lee is 2 minutes and 12 seconds. Actually, on this job the cabinets are "blued." Finish on the cabinets is baked for 7 minutes in another oven.

The product is distorted slightly during the degreasing operation, but goes back to shape during the cool-down period.

The Automotive Stamping and Manufacturing Company, Detroit, recently installed a completely convey-

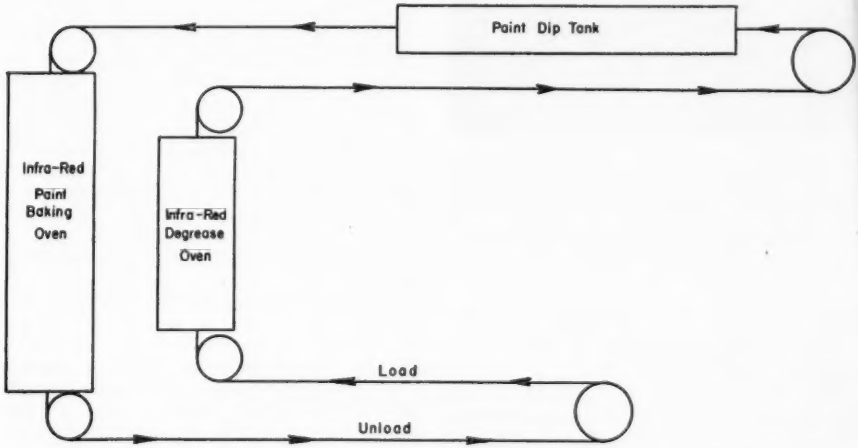


Fig. 4—Diagrammatic sketch of floor plan of paint finishing installation at the Automotive Stamping & Mfg. Co., Detroit, showing relative size and arrangement of process units and overhead transport conveyors

orized system for finishing electrical outlet boxes. Conveyor system, two infra-red ovens, dip tank, and adequate floor space for storage require an

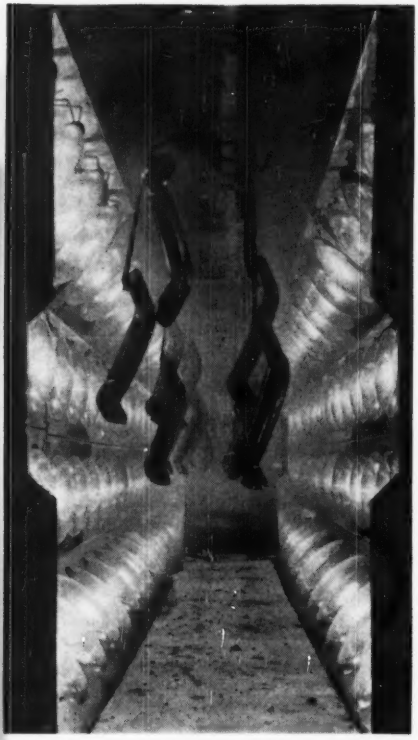


Fig. 5—A view of the infra-red oven used to remove grease from automotive parts prior to painting in the Automotive Stamping Company plant
(Drawings and photographs courtesy Fostoria Pressed Steel Co., Fostoria, Ohio)

area only 17 x 31 feet. Figures 4 and 5 show the floor plan and a view of the degreasing oven.

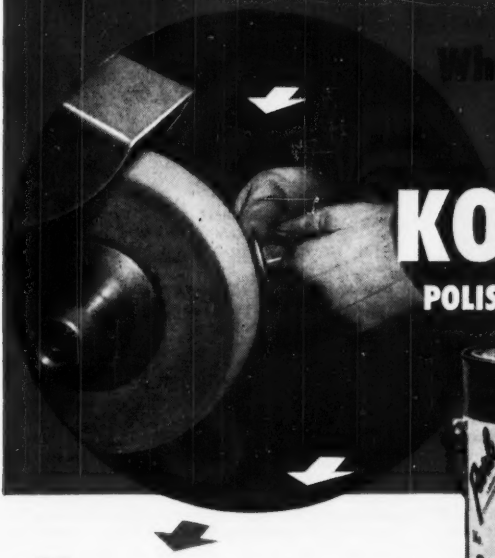
The new system is resulting in approximately a 55 per cent saving in finishing the boxes. Degreasing is done in 3 minutes in a 6½-foot oven. After degreasing the boxes dip automatically into a paint tank and then through a second infra-red oven (11 feet long) for a baking period of 5 minutes. The same worker that places the product on the conveyor removes the finished product after it is painted and baked.

Twenty years ago, more than 500 hours were required to complete the finishing of an automobile. A modern schedule requires less than 12 hours from the time a body is delivered to the paint shop until it is ready, fully trimmed and finished, to be set in place on the chassis. Along with the rapid decrease in the elapsed hours has come an almost proportionate increase in the quality of the decorative and protective finish with resulting benefits to the consumer.

Because of its excellent alkali, acid and chemical resistance, chlorinated rubber finds wide use in the protective coatings field, being extensively employed as a base for maintenance paints and concrete finishes. However, as was pointed out by J. B. Martin in *Canadian Chemistry and Process Industries*" (33:208, 1949) chlorinated rubber, of a viscosity suitable for brushing and spraying, is too hard and is not sufficiently flexible to be used as a paint vehicle without modification. Hence the chlorinated rubber normally must be softened with a plasticizer to improve flexibility and usually is compounded with a resin to improve adhesion and toughness. Alkyd resins are frequently used for this purpose. Thus, to obtain the best adhesion, gloss and toughness for a paint that is to be applied to metal, wood or concrete, the chlorinated rubber is modified with an appreciable quantity of alkyd resin.

Conversely, chlorinated rubber is employed as a modifier for alkyd resins. When used in the fortification of an alkyd finish, this substance materially increases the speed of drying, the initial hardness and the chemical resistance of the coating. While a finish of this type will not withstand strong alkalies or acids for any length of time, it is quite satisfactory for resistance to dilute acids and for concrete finishes.

Wheels CUT FASTER, LAST LONGER

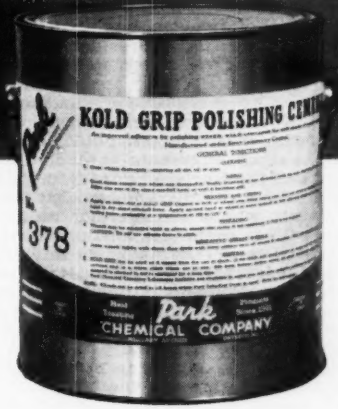


When treated with

Park

KOLD-GRIP

POLISHING WHEEL CEMENT



KOLD-GRIP Polishing Wheel Cement, laboratory-controlled through every step of production, will arrive at your plant *ready for use!* Viscosity is constant, regardless of normal temperature variations and the cement can be applied directly from the container . . . *without mixing or heating.* Kold-Grip is clean, odorless and very easy to handle.

Coarse or fine-grain abrasives set up right for fast cutting efficiency. Substantial savings are effected through longer over-all wheel life, fewer set-ups and reduced wheel inventory.

Wheels dry rapidly, are unaffected by humidity changes, and may be stored in any convenient plant area.

Let our polishing engineer demonstrate Kold-Grip for you, or send for free sample, telling us the metal to be polished, grain sizes to be used, and drying facilities available. We can help you if we hear from you.

Park

CHEMICAL COMPANY
8074 Military
Detroit 4, Mich.

NEWS of the Industry

NEW PLANTS

THE CARBORUNDUM COMPANY has started production of Carborundum silicon carbide in a new plant in Vancouver, Washington, it has been announced by H. K. Clark, president of the company. Costing over two million dollars, the plant is located on a 99-acre site adjacent to the Port of Vancouver Terminal, Number Two, and is considered one of the most modern plants of its kind. Its output augments that of similar plants of the Carborundum Company located in Niagara Falls, Quebec, Ontario, and Norway where the world's largest supply of silicon carbide is now produced.

Located to serve the abrasive and refractory needs of growing industries in the West, the Vancouver plant has the advantages of plentiful power from the Bonneville Power Administration and the proximity of raw materials.

Plant layout is designed to permit continuous material flow. In the Mix Building, all equipment is fully automatic, electrically operated and push-button controlled to gain maximum efficiency and freedom from dust.

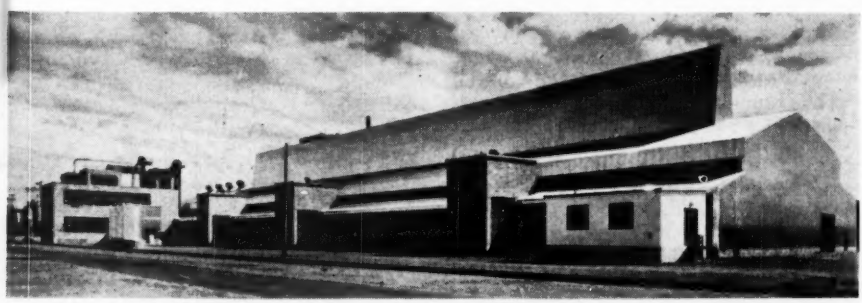
The furnace plant is of welded steel construction 100 x 560 feet and houses batteries of high temperature resistor-type furnaces which carry the electric current through a furnace core connected to electrodes in the heads of the furnaces.

Provisions have been made in the Maintenance and General Utility Building for a laboratory for the control of the raw materials and the finished products, a machine shop, electrical welding and blacksmith shop, storeroom, boiler and pump room, and garage.

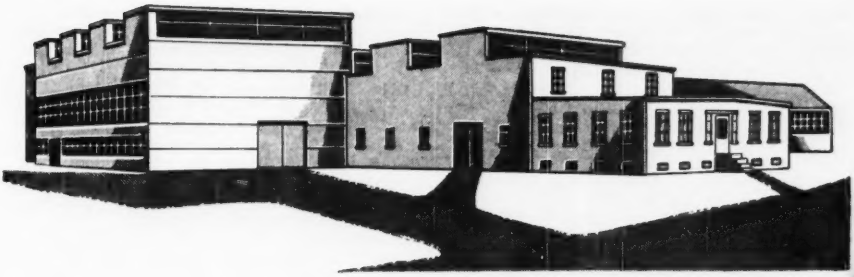
Throughout the plant great care has been taken to provide good working conditions for the employees required for operation of the plant. Very complete dust removal systems have been installed. Lockers, washrooms, and other facilities for the employees are located in the Maintenance and General Utility Building.

Management personnel for the operation of the plant are: J. L. Bergman, plant superintendent; A. C. Knapp, plant engineer; E. E. Einhorn, office manager.

METALWASH MACHINERY CORPORATION, formerly of 149 Shaw Avenue, Irvington, New Jersey, announces the



New plant of The Carborundum Company in Vancouver, Washington



New plant of Metalwash Machinery Corporation

opening of its new plant on U. S. Route 1 at North Avenue in Elizabeth, N. J. Located on a 4½ acre tract, it is served by all means of transportation.

The manufacturing area of more than 30,000 square feet is served by traveling cranes with capacities up to 35 tons, as well as railroad sidings. New machinery has been installed to provide better and more economical manufacture. The plant has a two-story air conditioned office building containing executive offices, as well as purchasing, sales, engineering, and accounting departments.

HOTPOINT, INC. has disclosed that it will erect a new refrigerator factory on a 21-acre site facing 1000 feet on 54th Avenue at 16th Street, Chicago. James J. Nance, president, who made the announcement, also said that tooling and machine installations to complete the conversion of the company's former range plant for the manufacture of home laundry equipment would be completed during the year.

These moves, which represent the final phase of the company's expansion program launched in 1947, will be accompanied by moving the manufacture of the Disposall into the company's plant at Milwaukee, where it will be made along with automatic dishwashers and sink units.

THE MINNESOTA MINING & MANUFACTURING CO., St. Paul, Minn., has purchased 26,000 square feet of additional office and warehouse space in Detroit, according to a recent announcement. Two buildings and nearly four acres of land are included in the property.

One structure, containing about 22,000 square feet of floor area, will house the branch offices and serve as a warehouse. The smaller building will provide some additional storage space. Both are of steel and brick construction.

COMPANIES

BETTER FINISHES AND COATINGS, INC., Newark, N. J., is now shipping Chromic Acid Flake, Technical Grade, produced in newly installed electrochemical equipment at its Newark plant. Analyses by independent testing laboratories indicate that the product is low in chlorides, sulfate and insolubles and exceeds U. S. Government Specification AN-A-21.

Chromic acid production is the first of a series of steps being made by Better Finishes & Coatings to expand its line of finishes, peelable plastic coatings, stop-off and masking compounds, and other chemical products.

HOUGHTON LABORATORIES, INC., Olean, N. Y., has announced its entry into the manufacturing field. Formerly an industrial consultant on protective coatings and corrosion control, Houghton Laboratories is manufacturing a series of anti-corrosive metal primers and surface coatings, as well as a plastic material called Hysol 6000.

In addition to manufacturing facilities, Houghton has built a pilot plant and elaborate research facilities in which Hysol products will be tested under all possible conditions, according to Russell Houghton, president. Mr. Houghton, who helped develop the Daystrom process for laminating plastic table tops, served as head of the Army Air Force experimental plastics laboratory at Wright Field, Dayton, Ohio.

THE ELECTRIC PRODUCTS CO., Cleveland, Ohio, has appointed the **J. J. COSTELLO COMPANY** as its representative in the New England States. With offices in Boston, Mass., and New Haven, Conn., the Costello Company has seven application engineers covering the New England States.

As part of an expansion program to increase its line of metal finishing chemicals, **ALLIED RESEARCH PRODUCTS, INC.**, Baltimore, has purchased the **R. A. HOFFMAN CHEMICAL COMPANY**, Cleveland.

In announcing this acquisition, H. C. Irvin, president of Allied Research, stated that R. A. Hoffman, formerly owner of the Hoffman Company, has joined Allied Research and will be in charge of the development of new types of organic finishes.

For the present, Allied Research will maintain Mr. Hoffman's former research laboratory at 224 High Street, Cleveland, as a branch of its Baltimore research division. However, his activities will be transferred to Baltimore when new laboratories have been completed at the Allied Research plant.

Seeking the answer to the secret of color is a special long range project set up August 1, 1948, by the Institute for Cooperative Research of The John Hopkins University. Sponsor of the project, the **PITTSBURGH PLATE GLASS COMPANY** has been a leader in the scientific use of color. In developing a special system of painting known as Color Dynamics, it has found that the use of certain colors and combinations have produced highly beneficial results.

According to Dr. W. R. Garner, director of the Institute's Psychological Laboratory, the project will cover a period of years, and the results will be used to implement the existing concept of the functional use of color in homes, schools, offices, institutions, and factories.

At the 23rd Annual Turco Management Conference held recently in Los Angeles, Sydney G. Thornbury, president of **TURCO PRODUCTS, INC.**, announced that 1949 was the company's greatest sales year since its inception as a three-man organization in 1927. During 1949 a new factory was established at McCook, Illinois, to supplement plants already op-

WOOD TANKS

Built to Specifications

66 YEARS OF TANK BUILDING SERVICE

Plating and pickling tanks built to your specifications is a Kalamazoo specialty — any size or shape — fir, oak, cypress or redwood.

Tanks on left were made for large manufacturer of automobiles. They are 88" x 64" x 62" — made of 8" long-leaf yellow pine with B & M anti-acid metal tie rods.

Write today for estimates and suggestions.

Kalamazoo TANK AND SILO COMPANY

328 HARRISON ST. • KALAMAZOO, MICH.

Turco President Thornbury addresses dinner meeting held in connection with Management Conference. L. H. Moulton, Turco vice president, may be seen at the left; Dan Buist, assistant national sales manager, at right.

erating in Los Angeles, Chicago and Houston.

L. H. Moulton, vice president and national sales director, presented a special citation to George J. Scherrer, manager of the Southern California sales district, at the conference's dinner meeting, for having the best sales record of 1949.

In addition to Los Angeles executives, the meeting was attended by Turco regional sales executives from the company's ten sales districts. Present for the meeting were: J. D. Charters and C. H. Williams of Houston, T. F. Brown of New York City, A. K. Beard of Cleveland, W. L. Donovan and Charles F. Devine of Chicago, Samuel B. Hewlings of Philadelphia, A. H. Massey of Atlanta, George J. Bruns of Kansas City, E. J. Brodersen of Seattle, Al Martinez of San Francisco, and George J. Scherrer and James L. Sweatt of Los Angeles.

N. A. Fowler, director of sales of the **GENERAL BOX COMPANY,** has announced the consolidation of the company's Chicago and Louisville sales territories.

The headquarters of the enlarged territory will be located at Louisville, where the General Box Company has, for many years, operated plants manufacturing corrugated boxes, wirebound boxes and crates, and wood cleated containers.

Purchase of the **SOUND PAINT MANUFACTURING CO.,** 1437 Leary Way, Seattle, Wash., manufacturer of industrial finishes since 1937, has been announced by A. H. Brawner, President of **W. P. FULLER & CO.,** San Francisco, California.

Under the new arrangement, the plant will be operated as the Sound Paint Manufacturing Company Industrial Division of W. P. Fuller & Company.

William F. Grubb, founder and owner of the company until its sale to Fuller, will remain as manager of the division.

ELECTRONIC RECTIFIERS, INC., Indianapolis, Ind., has announced the registration of its trade mark "Lektron" for electrical rectifiers. This is the trade name for its line of magnesium-copper sulfide dry disc rectifiers. "Lektron" Rectifiers employ magnesium radiator plates to reduce weight and provide improved heat dissipation.

THE MARTIN DENNIS COMPANY, a wholly-owned subsidiary of **DIAMOND ALKALI COMPANY,** with plants at Newark and Kearny, New Jersey, has become an operating division of Diamond, according to an announcement by Raymond F. Evans, president of the parent organization.

A producer of chromium chemicals. The Martin Dennis Company was organized in 1893 as a New Jersey corporation and was purchased by Diamond in March 1948.

A. J. Wittenberg, president of **SYNTHETIC RESINS, INC.,** Valdosta, Ga., has announced the appointment of the **CROWN WITTENBERG CHEMICAL CORP.,** Long Island City, as general sales agent for all its products.

Also announced was the appointment of **GEORGE E. HAND** as vice president of Crown. Formerly sales manager of the Crown Oil Products Corporation, Mr. Hand has devoted his time promoting the sale of drying oils, and he is considered to be an authority in the field.

Formation of a Public Relations Division of the **PENNSYLVANIA SALT MANUFACTURING COMPANY,** with Cleveland Lane as manager, has been announced by George B. Beitzel, president.

Mr. Lane, who previously served as Pennsalt account executive with Geare-Marston's Public Relations Department, came to Pennsalt from the Home Life Insurance Company in New York.

AMPCO METAL, INC., Milwaukee, Wis., has announced the appointment of **SOUTHERN ENGINE AND PUMP CO.,** Houston, Tex., as distributor of the Ampco Centrifugal Pump line.

The pumps are produced of Ampco Metal (aluminum bronze) throughout for the pumping of process acids, salts, alkalies, and other corrosive liquids.

NEW POSITIONS

At a recent meeting, **JOHN F. BLACK** announced his resignation as president and director of Circo Products Company, manufacturer of industrial and automotive vapor degreasing equipment.

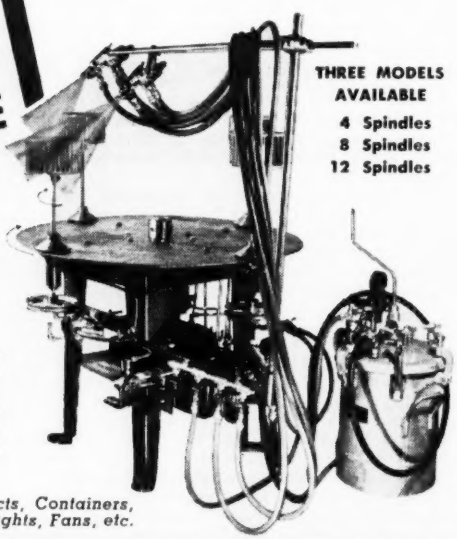
JOSEPH W. POWELL, JR., vice president of the American Research and Development Corporation of Boston, was elected president, and **FENTON M. DAVISON,** vice president, was placed in charge of all operations of the company.

New general offices of the company have been opened at 6531 Euclid Ave., Cleveland 3, Ohio. Due to the unrelated methods of manufacture of Circo's two major cleaning equipment lines, the company will operate its main plant at 1965 East 66th Street in Cleveland for the manufacture and servicing of its Dee Tee equipment. Manufacturing facilities have been secured on the west side of the city for the forming, welding and complete assembly of the large degreasers for all types of metal cleaning.

GUY A. BAKER has been appointed vice president in charge of manufacturing and **R. MERTON SHIELDS** has been appointed secretary of The Duriron Co., Inc., Dayton, Ohio.

For several years Mr. Baker has been assistant to the president and secretary of the company. Prior to that he was manager of Duriron's Alloy Castings

HOLLAND
automatic-pneumatic
SPRAYING MACHINE



THREE MODELS AVAILABLE
4 Spindles
8 Spindles
12 Spindles

- **GIVES AN EVEN FINISH**
- **SPEEDS UP PRODUCTION**
- **IMPROVES QUALITY OF PRODUCT**

This new fully automatic, portable spraying machine is activated *solely* by air pressure. Only one operator is needed to load, and remove finished and unfinished work. WRITE FOR FULL INFORMATION.

Ideal for spraying: Cans, Novelties, Compacts, Containers, Aluminumware, Electrical Appliances, Flashlights, Fans, etc.

J. HOLLAND & SONS, INC. ■ 276 SOUTH 9th ST., BROOKLYN 11, N. Y.

Sales. During his 20 years' association with the company, he has been very active in metallurgical research and development. He is affiliated with numerous technical societies.

Guy A. Baker (left), R. Merton Shields

Mr. Shields is a mechanical engineer graduate of Michigan College of Mining and Technology, and prior to his new appointment was manager of Dayton District Sales for Duriron. He has been with the company since 1936.

MILTON F. BEECHER was elected vice president in charge of research and development of the Norton Co., Worcester, Mass., recently.

GEORGE N. JEPPSON was re-elected board chairman and **MILTON P. HIGGINS**, president. **RALPH F. GOW**, executive vice president, was elected vice president of Norton Pike Company, and **RALPH M. JOHNSON**, vice president in charge of sales of the Norton Company, was named to the Norton Pike Company board.

Mr. Beecher entered the company's ceramic section in 1915 and had been director of research since 1941. A graduate of Iowa State College, he is a member of the executive committees of the Institute of Ceramic Engineers and the American Ceramic Society.

The Matchless Metal Polish Co, Chicago, Ill., and its subsidiary, Advance Polishing Wheels, Inc., have announced the appointment of **SAM B. CROOKS**, 1401 Santa Fe Ave., Los Angeles 21, Calif., as their West Coast representative.

Mr. Crooks has long been associated with the metal finishing industry and is thoroughly familiar with many of the problems encountered in this field. He will have a direct factory connection with both companies, and soon will carry adequate stocks of all Matchless compounds.

LYMAN C. ATHY has been appointed technical assistant to the president of Pemco Corp., Baltimore, Md. According to an announcement made by Richard Turk, president, Mr. Athy will consult with the staff on technical matters and direct his efforts toward coordinating and expediting research and development, manufacturing procedures and problems, as well as customer problems and customer service.

A graduate of Ohio State University, Mr. Athy has 25 years of extensive practical production and research and development experience in the porcelain enamel industry.

Appointment of **WALTER A. BAYER** and **WILLIAM F. CLEMONS** to the Detroit district sales staff of The Udylite Corporation has been announced by L. V. Nagle, vice president in charge of sales.

Mr. Bayer has been with the Estimating Department of Udylite since 1946 and is a graduate of the University of Detroit.

Walter A. Bayer (left), William F. Clemons

Mr. Clemons received his chemical engineering degree in 1948 from Lawrence Institute of Technology and has been a chemist in the firm's laboratories for two years.

J. RALPH MACON has recently joined Pennsylvania Salt Manufacturing Company as an engineer in the Market Research Division, it has been announced by George T. Collins, manager of the division.

Mr. Macon, formerly associated with Du Pont's Electrochemicals Department, will work on market development of new Pennsalt products for the metallurgical industry.

The Norton Co., Worcester, Mass., has announced the transfer of four members of its outside sales department. **WILLIAM C. HOWARD**, formerly field engineer in the Hartford, Connecticut area, has been named abrasive engineer with headquarters in New Haven.

JOHN W. McCUE, F. DONALD WING, and **JOHN W. WHEELER** have been appointed field engineers. Messrs. McCue and Wing will report to Raymond E. Taylor, district manager of the Chicago office, and Mr. Wheeler will replace Mr. Howard at Hartford, reporting to Connecticut district manager Ronald W. Price, All four men are recent graduates of the Norton Sales Training Course.

DR. FRANKLIN T. PETERS has been assigned to the newly formed Development Department of Glyco Products Co., Brooklyn, N. Y. He has been with the company in the Sales Department since 1947, following ten years with the Du Pont Company in research positions.

Dr. Peters will be available for consultation on new chemical products to be made in the extensive facilities available at the Natrium, West Virginia plant.

GEORGE M. HARTLEY has been appointed manager of the General Electric Company's Glyptal alkyd resin plant in Schenectady, N. Y., according to an announcement by Paul F. Preston, manufacturing manager of the Chemicals Division. This plant manufactures resins for use in the paint industry, polyester resins for the coatings industry, plasticizers, varnishes, and other chemicals.

Vince Gilliam of The Man-Gill Chemical Co., Cleveland, Ohio, special cleaner manufacturer, has announced the addition of **EARL ESNER** to the staff. Mr. Esner's principal duties during the next few months will be the securing of distributors.

10 TIMES HIGHER ABRASION RESISTANCE . . .
standard abrasive wheel test

4 TIMES HIGHER SNAG RESISTANCE . . .
standard needle test

MUCH HIGHER CHEMICAL RESISTANCE . . .
standard strip immersion tests
. . . than natural rubber or standard synthetics

SURETY SURESEAL Synthetic Rubber Gloves
ADD UP TO SAFER HANDS, LONGER WEAR, LOWER HAND PROTECTION COSTS

Ask for Surety's unique Glove Selector, the quick guide to the right glove material for your operations. Dept. P.

THE SURETY RUBBER CO. CARROLLTON, OHIO

EXOLON

The background photograph shows grains of Exolon RST enlarged about 20 times.

● Exolon is aluminum oxide fused in an electric arc furnace to form a very hard enduring substance. When pieces like the one shown at the right above are crushed, a most useful abrasive grain is provided.

Exolon RST is made from this material. After careful grading and magnetic separation, it is ceramically coated to increase adhesion to the set-up wheel. It is suitable for your use in all types of metal finishing. Write for literature.

THE EXOLON COMPANY

943 East Niagara Street, Tonawanda, N. Y.

Manufacturers of SILICON CARBIDE *and* ALUMINUM OXIDE ABRASIVES

JOHN C. EWER, Norton Company abrasive engineer in the Boston district, has been appointed assistant general manager of Norton Grinding Wheel Company, Ltd., which is a branch plant in Welwyn Garden City, Herts, England. He will leave for England to take over his new responsibilities about May 1. Announcement of the appointment was made by Herbert A. Stanton, vice president and general manager of the Company's foreign division.

Mr. Ewer joined Norton Company in 1934. Following an extensive sales training course, he entered the abrasive division's sales engineering department. He later became field engineer in New England, and in 1944 was assigned to the Boston district as abrasive engineer.

RAYMOND J. FORKEY, abrasive engineer in Rochester, New York, will take over the district vacated by Mr. Ewer.

In order to broaden and increase its scope of service to the jewelry manufacturing industry in New England, the American Silver Co., Inc., Flushing, N. Y., has appointed **ROBERT F. McKAIG** of Providence, Rhode Island, to its sales and service staff.

Mr. McKaig, a veteran of 16 years in this field, will make his headquarters at the company's Providence office.

The Electro Chemical Supply & Engineering Co., Emmaus, (Allentown) Pa., has announced the appointment of **FRED G. BAKER** as director of engineering and design. Mr. Baker is a chemical engineer, graduate of the Iowa State College, 1940, and until recently was a member of the Engineering Department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.

Also announced was the appointment of the **H. D. FOWLER CO., INC.,** Seattle, Wash., as agent in the Northwest. Mr. Fowler, head of the company, has had long experience in water works and industrial supplies and equipment, including acid and alkali-proof construction work.

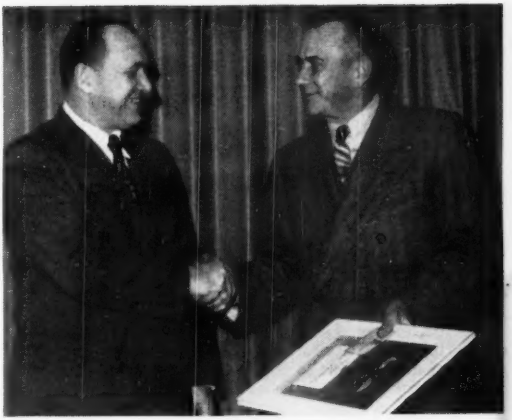
FRANCIS B. FOLEY has joined the staff of the Research Laboratory of The International Nickel Company, Inc., at Bayonne, N. J., as consuting metallurgist, N. B. Pilling, director of the Laboratory, has announced.

A collaborator with the late Henry M. Howe after World War I, Mr. Foley joined The Midvale Company, Philadelphia, in 1926 in a research capacity and later became chief research engineer. He was president of the American Society for Metals for the 1948 term, and is a director-elect of the American Institute of Mining and Metallurgical Engineers.

G. R. BROPHY, research metallurgist, has been appointed to head the New England Technical Section of International Nickel Company's Development and Research Division located in Hartford, Connecticut, according to an announcment by T. H. Wickenden, vice president and a manager of the Division. He succeeds the late D. A. Nemser.

Educated at Rensselaer Polytechnic Institute, Mr. Brophy is a member of the American Institute of Mining and Metallurgical Engineers and the American Society for Metals, and is the author of several technical papers.

JOHN C. HAMPSON, former Indiana field representative for the Pennsylvania Salt Manufacturing Company's Special



L. K. Lindahl (right), receiving certificate attesting to his appointment as "Admiral of The Flagship Fleet"

Chemicals Department, has been named sales manager for the department's newly-formed Chicago district, according to an announcement by Joseph J. Duffy, Jr., department manager of sales.

The new sales district, with offices at 20 North Wacker Drive, Chicago, will include the present Wisconsin, Illinois, Indiana, and Missouri territories.

Mr. Hampson joined Pennsalt in 1936 as a salesman for the B-K and Household Products Department. In January 1943 he transferred to Special Chemicals and since then has been working out of Indianapolis.

At a meeting of the board of directors, **WILLIAM A. MUNKACSY** was elected president of Munray Products, Inc., sales division of The Poly-Cyclo Products Co., Cleveland, Ohio. Mr. Munkacsy, who is also president of The Poly-Cyclo Products Company, succeeds T. R. Gill, who recently resigned as head of Munray Products.

The board agreed to retain Ray W. Grace as vice president in charge of sales and Ernest A. Munkacsy as secretary.

Appointment of **HAROLD A. EDLUND** to the office of director of sales of The Arco Company, Cleveland and Los Angeles manufacturer of paints, varnishes, lacquers, enamels and many related products, has been announced by H. E. Wise, president. Mr. Edlund's headquarters will be in the company's executive offices in Cleveland, Ohio.

HONORS

L. K. LINDAHL, president of The Udylite Corporation, was recently commissioned "Admiral of The Flagship Fleet," an honorary organization sponsored by American Airlines.

Presentation of a certificate signifying Mr. Lindahl's appointment was made by Brigadier General L. G. Fritz, vice president in charge of operations, American Airlines. The ceremony took place following a luncheon honoring Mr. Lindahl at Detroit's Recess Club.

TRAINING COURSES

HENRY A. GARDNER LABORATORY INC., 4723 Elm St., Bethesda 14, Md., is planning to repeat its Educational Course on Appearance Measurements. Given at its Bethesda plant by Richard S. Hunter and other members of the laboratory staff, the program has been enlarged with new lectures on, "Definitions of Appearance Quantities," and "Procedures for Color Measurements." Laboratory facilities for work by students have been enlarged with completion of a new colorimetric goniophotometer and other apparatus.

Industrial instrumentation training school schedules to be conducted for the first six months of this year by **BROWN INSTRUMENTS DIVISION** of the Minneapolis-Honeywell Regulator Company at the Brown School of Instrumentation in Philadelphia include four short courses of five weeks each and one long course of 13 weeks. In addition, intensive courses will be held for specific industries.

The regular, comprehensive, 13-weeks' course began February 27 and will end May 26. In this, and in the shorter courses, lecture and bench instruction will consider new and improved types of industrial measuring, indicating and

controlling instruments, including millivoltmeter-type pyrometers, continuous balance (ElectroniK) potentiometers, electrically-operated automatic control, flow meters, thermometers, pressure gauges, hygrometers, air-operated automatic control, Moist-o-Graphs, tachometers, resistance thermometer-carbon dioxide, and analygraph.

April 10 to 14, inclusive, is the period of the second quarterly instrumentation course for 1950 conducted by the **FISHER & PORTER CO.**, East County Line Rd., Hatboro, Pennsylvania.

Manufacture, calibration, installation, operation, and maintenance of the company's line of process control instruments will be covered in the course.

MEETINGS

The annual meeting of the **ROCKFORD BRANCH** of the **A.E.S.** will be held March 18 in Rockford, Illinois. An interesting and worthwhile educational and social program has been planned.

NALCO
Infra-Red UNITS

Speed Industrial Drying, Baking and Heating

Engineered for production use, Nalco Infra-Red Lamps with long-lasting carbon filaments give less glare, more penetrating heat . . . assure completed jobs at a faster rate—and at a much lower cost.
From single units, strips and portable units to banks and ovens, Nalco Infra-Red Lamps and units can be "tailored" to speed up *your* production.

Write for "Drying Problems Made Easy"

NALCO INFRA-RED DRITHERM

NORTH AMERICAN *Electric Lamp Co.*

1020 TYLER ST. ST. LOUIS 6, MO.

SOCIETIES

L. A. ADAMS, Chicago Vitreous Enamel Product Co., has been named chairman of a new division of the **NATIONAL SAFE TRANSIT COMMITTEE** known as the **MANUFACTURERS' COORDINATING DIVISION.** Under Mr. Adams' direction, this group will act as a consulting committee which will acquaint individual manufacturers with the functions and benefits of the National Safe Transit Program, a cooperative industry effort to reduce shipping damage to major household applicances and allied metal products by means of systematic pre-shipment testing of the packaged product.

According to Mr. Adams, committee members will be appointed soon with particular attention to geographic concentration of manufacturers in the finished-metal-product industry so that coverage by Division members will be as complete and efficient as possible. Members will be equipped to explain the purposes of the National Safe Transit Program, the requirements for Safe Transit certification, and the benefits and profits to be obtained by participation in the Program.

Columbia University's Department of Chemical Engineering is conducting basic research in electroplating under an annual $1700 grant from the **AMERICAN ELECTROPLATERS' SOCIETY.** The study is a cooperative research project of the metal finishing industry.

The grant provides for a $1200 fellowship and an additional stipend of $500 for the department to support the research. The first holder of the followship is Edward B. Saubestre. The work is being conducted under the direction of Professor Henry B. Linford of the Chemical Engineering Department.

At the annual meeting of **THE ALUMINUM ASSOCIATION** held January 17-19 in New York, R. S. Reynolds, Jr., of the Reynolds Metals Company, Richmond, Va., was elected president for the ensuing year. The following were elected vice presidents: E. G. Grundstrom, Advance Aluminum Castings Corp., Chicago; M. E. Rosenthal, United Smelting and Aluminum Company, Inc., New Haven, Conn.;

BETTER--SIMPLER--LOWER COST

NEW FINISH FOR ALUMINUM

IRIDITE®

ALCOTE

At last! The long looked for addition to the low-cost Iridite family of corrosion resistant metal finishes has arrived. It's Iridite Alcote . . . a simple, chromate-type, one dip cold process that produces a durable, non-porous film on the surfaces of any form of aluminum.

COMPARE these Iridite Alcote advantages with any other aluminum finishing process available

- **SIMPLEST OPERATION**—Iridite Alcote process is non-electrolytic—requires no heating or exhaust equipment—can be applied by dipping, spray or brush.
- **ONE SOLUTION**—of Iridite Alcote does the job and requires little control.
- **FASTER PRODUCTION**—10 seconds to 2 minutes immersion, time depending on specifications.
- **NO SPECIAL CLEANING**—standard procedures give adequate preparation.
- **BETTER CORROSION RESISTANCE**—salt spray resistance as high as 1000 hours on wrought stock, 250 hours on castings.
- **BETTER ABRASION RESISTANCE**—buffing, bending or scraping will not cause coating to flake or peel.
- **BETTER PAINT BASE**—makes paint stay put on any form of aluminum.
- **BETTER APPEARANCE**—color selection from clear to iridescent yellow.
- **BETTER WELDABILITY**—aids shielded-arc welding, retains protection adjacent to weld.

All at a savings up to 50% over other materials

Ask your IRIDITE representative for full information and samples, or send us a sample of your production for free processing.

ALLIED RESEARCH PRODUCTS, INC.

4004 EAST MONUMENT STREET
BALTIMORE 5, MD.

and George N. Wright, The John Harsh Bronze and Foundry Company, Cleveland. A. V. Davis, Aluminum Company of America, New York, was re-elected chairman of the board, and Donald M. White was reappointed secretary and treasurer.

Three directors-at-large were elected to serve for three-year terms: A. P. Cochran, Cochran Foil Company, Inc., Louisville, Ky.; D. A. Rhoades, Kaiser Aluminum & Chemical Corp., Oakland, Calif.; and R. J. Roshirt, Bohn Aluminum & Brass Corp., Detroit, Michigan.

The Association's foil, foundry, extruded products, and sheet divisions also held sessions during the three-day meeting. **John T. Watry**, Aluminum Casting & Engineering Company, Milwaukee, Wis., was elected chairman of the foundry division; Louis Fischer, Fischer Casting Company, North Plainfield, N. J., was elected vice chairman; and H. J. Hater, of Aluminum Industries, Inc., Cincinnati, Ohio, was appointed to represent the division on the Association's board of directors. In the sheet division, L. M. Brile of Fairmount Aluminum Company, Fairmount, W. Va., was elected chairman, and George M. Carter, of the Sheet Aluminum Corp., Jackson, Mich., was named to represent the division on the board of directors. Harold C. Wilson, Revere Copper and Brass, Inc., Baltimore, Md., was elected chairman of the extruded products division and appointed the division's representative on the board of directors.

Member companies of The Aluminum Association account for all the primary aluminum production in the United States and about 85 per cent of aluminum semi-fabricated products.

NECROLOGY

The Hilo Varnish Corporation has announced the death of **GEORGE F. ENGLISH** on January 2.

Mr. English had served the company for over 28 years, and at the time of his death was manager of the Hilo Chicago branch.

RICHARD H. ALDEN, former sales representative for Frederic B. Stevens, Inc., died at Toledo, Ohio, on February 14. Mr. Alden, who was a very active member of the American Electroplaters' Society, represented the Stevens organization in the western part of Michigan.

NEW and better

BFC LACQUER THINNER

with these extra values at no extra cost

Better Solvent Strength—You can use higher-solids

Better Flow Out—Less Orange Peel—Less Blushing

Better Gloss in Your Coatings.

Chances are that BFC LACQUER THINNER costs no more—possibly less—than you now pay. You have everything to gain—nothing to lose—by getting our price and special Test-Sample Offer. Write today.

Better Finishes and Coatings, Inc.

268 Doremus Avenue, Newark 5, N. J.

122 East 7th St., Los Angeles 14, Calif.

Cambridge WOVEN WIRE BELTS

Tailored to your Production Needs

Your Cambridge woven wire conveyor belt is engineered from the raw materials to the finished belt to give you maximum efficiency with a minimum of attention and maintenance.

Cambridge designs withstand heavy loads, high temperatures, cold, corrosive compounds or wet processes. They may be fabricated of any metal alloy in any mesh and weave. Where necessary, Cambridge belts can be fitted with various types of selvages, cleats and drives.

A Cambridge Rod-Reinforced Belt with Plate Selvages and Fabric Cleats provides cost-cutting continuous quenching of screws, nuts and bolts. This belt design offers the highest tensile strength, low thermal capacity and successful operations in temperatures as high as 2100° F.

Call your Cambridge Field Engineer whenever you have a problem concerning movement of materials during processing.

VALUABLE BOOK, FREE! A complete, basic reference on conveyor belts, designs, systems and metallurgy. Write for your copy or call your nearest Cambridge office.

Cambridge Wire Cloth Co.

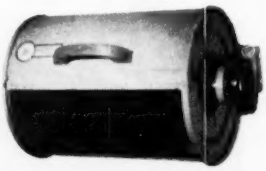
Wire cloth in rolls. Also specialized wire fabrications

Department A
Cambridge 3, Md.

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

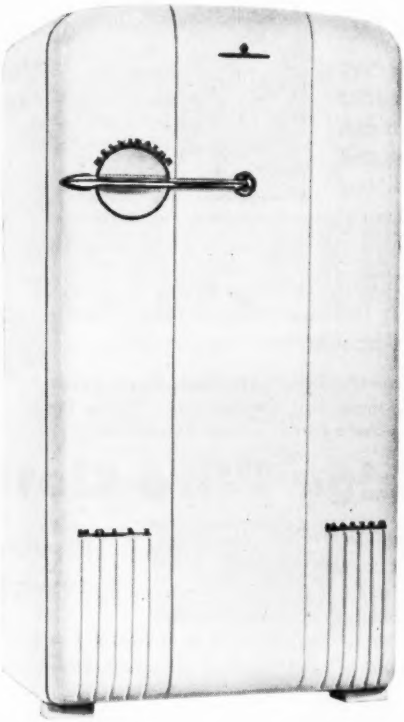
See "Belting, Mechanical" in your Classified Telephone Directory.

Finishes



This photographic darkroom light, a product of the Golden "B" Manufacturing Company, Inc., is enclosed in a steel case attractively coated with a wrinkle finish and so designed that the operator can rotate the light through 360 degrees.

(Photo courtesy Bakelite Corp., New York 17, N. Y.)



Kelvinator's full-length door "Moist-Master" refrigerator is finished in Permalux, an urea-formaldehyde modified alkyd enamel, baked 30 minutes at 300 deg. F. For extra resistance to food acids the bottom interior is coated with vitreous enamel. Chromium plated identification plates and fittings add attractiveness to the refrigerator exterior.

(Photo courtesy Kelvinator, Division of Nash-Kelvinator Corp., Detroit 32, Mich.)

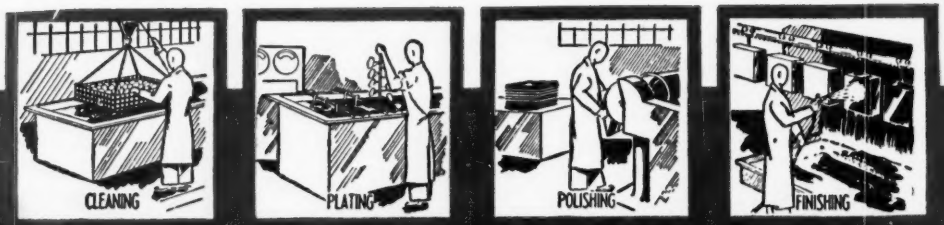
that aid in appearance and utility

The Golden Royal Portable has sides, carriage ends, and many fittings brilliantly gold plated. The top and paper table are sprayed with a black enamel finish baked on with infra-red heat. The Finger-Flow Keys are enclosed by gold plated key rings.

(Photo courtesy Royal Typewriter Co., Inc., New York 16, N. Y.)

The steel casings of the Model 954 Duo-Therm Hepplewhite furniture-styled space heater receives a primer coat baked at 450 deg. F. and three finish coats applied at 30-second intervals also baked at 450 deg. F. The top grille is coated with a modified silicone finish for increased heat resistance.

(Photo courtesy Duo-Therm, Division of Motor Wheel Corp., Lansing 3, Mich.)



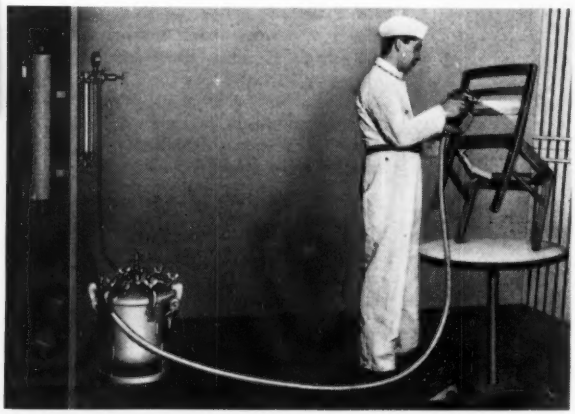
New • EQUIPMENT • MATERIALS • PROCESSES

Therm-O-Spray

Therm-O-Spray, a simple and effective attachment for hot spray painting, is manufactured in Sweden and distributed by Douglas Wilson & Co., Inc., 101 Park Ave., New York 17, New York.

The Therm-O-Spray equipment consists of a paint heater to be connected to the user's spray gun and also a thermostatically controlled air heater of 1,000-watt capacity. This heater supplies the hot air used for heating the spraying material in the paint heater. The same hot air is used for atomizing the paint in the nozzle of the spray gun. An air hose of special rubber for heated air is provided and is made to withstand a working temperature of 300 deg. Fahrenheit.

Advantages claimed for the Therm-O-Spray method include: fewer coats of paint required; paint flows easily and provides a glossy finish; strong paint film; moisture-free air; quickly reaches operating temperature; decrease in drying time and spray dust; and a savings in thinner, operating time, and paint.



Therm-O-Spray Installation in use

Molded Pail for Corrosives

A molded three-gallon pail, utilizing a virgin rubber base compound and other original features for greater safety and serviceability in the handling of acid and alkaline chemicals, has been developed by Stokes Molded Products, Inc., 240 Webster St., Trenton 4, New Jersey.

Described as light, shock-resistant, rigid, and almost chemically inert, the pail is equipped with a bail-type handle of lead plated stainless steel with a hard rubber grip. Other safety features are the pouring lip which reduces drip, and the molded tipper on the bottom of the pail which provides a firm hold for accurate control in pouring hazardous contents.

The pail is available with graduated markings for measuring one to twelve quarts or one to three gallons.

Silver Lacquer 26-CN

The Egyptian Lacquer Manufacturing Co., P. O. Box 444, Newark 1, N. J., has introduced its Silver Lacquer 26-CN especially developed for coating silver or silver plated articles.

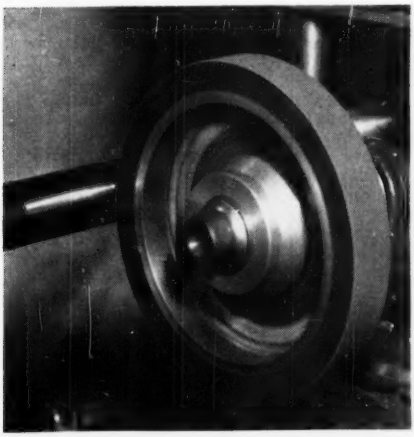
Applied by dip or spray, the lacquer forms a water white finish which leaves a crystal clear film on the object, and preserves the natural color of the silver. Remarkably tough, it is claimed to possess exceptional sulfide-tarnish resistance.

Cone-Loc Drum Sander

Product of the American Diamond Saw Sales, 120 N. W. Ninth Ave., Portland 9, Ore., the Cone-Loc Drum Sander replaces endless belt coated abrasives with strips of the same type coated abrasives torn off a shop roll.

The Cone-Loc Drum Sander is a split drum, cushioned with rubber. Abrasive strips are wrapped around the outside and secured in place by sharp pins. When the sander halves are closed up and the special cone-shaped washer is tightened down by the arbor nut, the sander becomes one solid abrasive wheel. Worn abrasive strips can be replaced in a few seconds' time.

The unit is claimed to perform almost all functions now being handled by solid abrasive wheels, backstand grinders, contact wheels, and so on.



Cone-Loc Drum Sander in use

Electric Immersion Heater

An electric immersion heater especially designed to be used for heating acid pickling solutions and various kinds of

Electric immersion heater mounted on acid pickling tank

electroplating solutions has been announced by the Amersil Co., Inc., 900 Passaic Ave., East Newark, New Jersey.

The unit consists of an opaque fused quartz shell enclosing a suitably supported Nichrome electric heating element. The opaque quartz shell is in turn protected with a high temperature acid-resistant resilient head or a flange through which lead wires are conducted into the heater. The fused quartz shell is said to have the advantageous combination of complete inertness to corrosive chemicals, a high rate of heat transfer, unusually high electrical resistance, and immunity to thermal shock. The acid-resistant head or flange may also serve as a convenient means of mounting the unit to kettles, tanks, and so on.

Lead wire corrosion problems are said to be eliminated by reason of the fact that the leads are brought into the heater through the acid-resistant side arm and head or flange.

The Amersil Electric Inimersion Heater, supplied with chemically-resistant leads, is available in tube lengths from 15 to 31 inches and power ratings from 200 to 5000 watts. Heaters with power ratings below 1000 watts are recommended for use with 115-volt power; above 1000 watts a 230-volt power source is recommended.

New Iridite Products

Among the products announced recently by Allied Research Products, Inc.,

Baltimore, Md., are a powder form of an Iridite coating for the corrosion protection of zinc and cadimum and a new type of organic brightener for zinc plating solutions.

Iridite No. 8-P, the powdered Iridite, is claimed to achieve savings in shipping costs and eliminate the need for returnable packaging.

The zinc plate brightener compound, called ARP No. 3, is supplied in liquid form for use in any type of zinc plating bath.

Series D Rotary Floor Magnetool

A long low-clearance (2¾ inches) handle which permits the operator to pick up steel chips, without stooping, from under places not accessible is a feature of the Series D Rotary Floor Magnetool announced by the Multifinish Manufacturing Co., Dept. 491, 2114 Monroe Ave., Detroit 7, Mich. There are no wires; thus, area of operation is unlimited.

For use on floors, driveways, in tanks, and many other areas where steel chips, nails, screws, and so on, are a safety or scrap problem, or where rapid removal of steel parts is required, the Magnetool has a permanent magnet—not electric—

Model D-20 Series D Rotary Magnetool in use

sealed in the tube. It is waterproof and oilproof, and acidproof models are available for use in tank solutions.

The floor Magnetool is propelled in carpet sweeper fashion, a powerful magnetic tube rotating with the wheels. Steel parts jump to the tube, loading automatically over the entire 360 degrees of magnetic surface. Unloading is by means of a Neoprene wiper ring which pushes parts to a non-magetic area at either end, where the entire load is instantly released. No loss in magnetic power results from constant contact with steel, the manufacturer states.

Other special features of the unit include stronger Alnico magnets, increased capacity and size, a clean-sweep replaceable wiper, stronger frame assembly, and more rigid and durable wheels. It is available in five sizes.

Dampney Vinyl Coating

A new vinyl resin formulation designed to meet a wide range of surfacing requirements involving moisture and chemical resistance has been announced by The Dampney Company of America, Hyde Park, Boston 36, Massachusetts,

BOOTHCOTE

cleans spray booths quickly, economically, safely!

Spray Boothcote on clean booth. Surplus paint can then be peeled off in sheets by any operator.

- Saves time and labor
- Time-tested; used for 11 years
- Mixed—ready to use
- Can be brushed or sprayed
- Non-inflammable; safe to store
- Does not flake off

Money back trial offers: 5 gals. $6.25 f.o.b. Buffalo or write for Circular.

Distributors! Write for open territories.

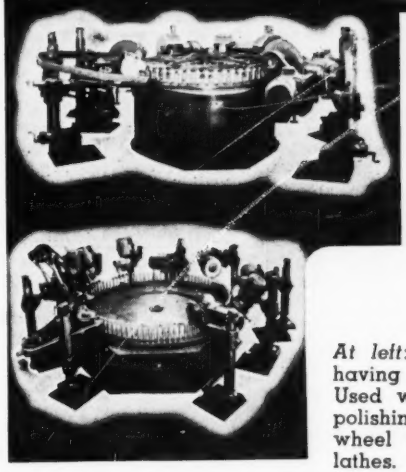
HYGRADE FOOD PRODUCTS CORP.

Boothcote Div., 19 Stetson St., Buffalo 6, N. Y.

ROTARY AUTOMATICS • SEMI-AUTOMATICS • STRAIGHT LINE AUTOMATICS

• FOR HIGH PRODUCTION POLISHING AND BUFFING •

ACME CONTINUOUS ROTARY Automatics



Put Polishing and Buffing Operations on a Production Basis!

At left above: ACME 6-ft. Continuous Rotary having 50 continuous revolving chuck spindles —1 polishing head and 5 buffing heads. Used for finishing octagon plumbing goods escutcheons.

At left: ACME 10-ft. Continuous Rotary having 96 continuous revolving spindles. Used with 2 ACME Type G-3 Universal polishing belt heads with floating back up wheel and 8 ACME Type G-3 buffing lathes. Used for polishing and buffing brass door knobs.

ACME Continuous Rotaries are built in various table sizes from 20 inches to 10 feet or more in diameter. They are adaptable to a great many arrangements that keep finishing costs down on polishing and buffing operations.

ACME builds Straight Line and Rotary Automatics, Semi-Automatic and Special machines to handle virtually any type or size of polishing and buffing operation on a production basis. Acme Automatics cut finishing costs and get more output per man-hour. Payroll dollars buy more production when ACME machines are used!

SPECIAL MACHINERY — AUTOMATIC BUFFING MACHINES

ACME Manufacturing Co.

1645 HOWARD ST. DETROIT 16, MICH.

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR OVER 35 YEARS

manufacturer of specialty protective coatings. The material, identified as Dampney Vinyl Coating, may be modified and adapted to meet individual needs within that area of service.

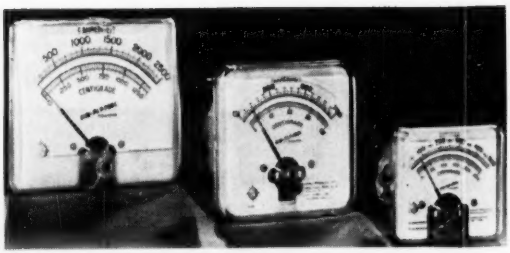
Dampney Vinyl Coating is recommended for service over an operating temperature range of—40 to 160 deg. F., wet or dry. It is claimed to be resistant to alkalies and mineral acids, is insoluble in alcohols, greases, oils, and aliphatic hydrocarbons, and has low permeability to water vapor and low water absorption. It is therefore particularly effective in applications where metal is subject to deterioration from chemical or moisture attack. An applied film of this material is non-flammable and imparts neither taste, odor, nor toxicity. It may therefore be used without fear of contamination on surfaces to come in contact with foods, beverages or pharmaceuticals, it is stated by the manufacturer.

Dampney Vinyl Coating is said to develop excellent adhesion to relatively smooth surfaces without heat curing. The material air dries rapidly so that equipment may be placed in service one hour after coating. The resulting surface is extremely tough and durable as well as decorative. Application may be made either by brush or spray; coverage is 400 square feet per gallon; colors available include clear, black, or gray.

Simplytrol Indicating Pyrometers

Three sizes of precision pyrometers for panel mounting have been announced by

Simplytrol Indicating Pyrometers



Assembly Products, Inc., Chagrin Falls, Ohio. With unbreakable, clear plastic, one-piece front covers these three models offer new design possibilities. Eight ranges cover temperatures from minus 75 to 3000 deg F. with corresponding ranges of minus 60 to 1600 deg. Centigrade.

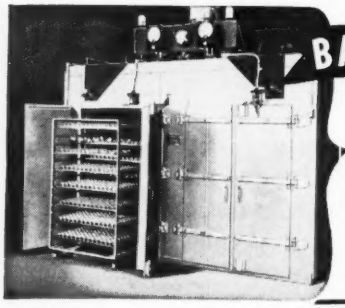
Both Fahrenheit and Centigrade calibrations are shown on the dials. Standard models may be used with Chromel-Alumel and Iron-Constantan thermocouples.

The pyrometers are equipped with automatic cold junction compensation, and the high resistance millivoltmeter movements have copper correction for maximum accuracy.

The movements are designed for rugged industrial service with oversize moving coils, Alnico V magnets, and sapphire jewels.

Workable "Teflon" Tetrafluoroethylene Resin

Widespread use of "Teflon" tetrafluoroethylene resin has been held up by difficulties encountered in fabricating it, according to the manufacturer, E. I. du Pont de Nemours & Co., Polychemicals Dept., Wilmington 98, Del. The very prop-



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For Processing • Varnish Baking • Paint and Lacquer Drying • Lithographing and Decorating. Batch or Conveyor Types for any fuel. Write for Bulletin 5.

YOUNG BROTHERS COMPANY

1837 Columbus Road Cleveland, Ohio

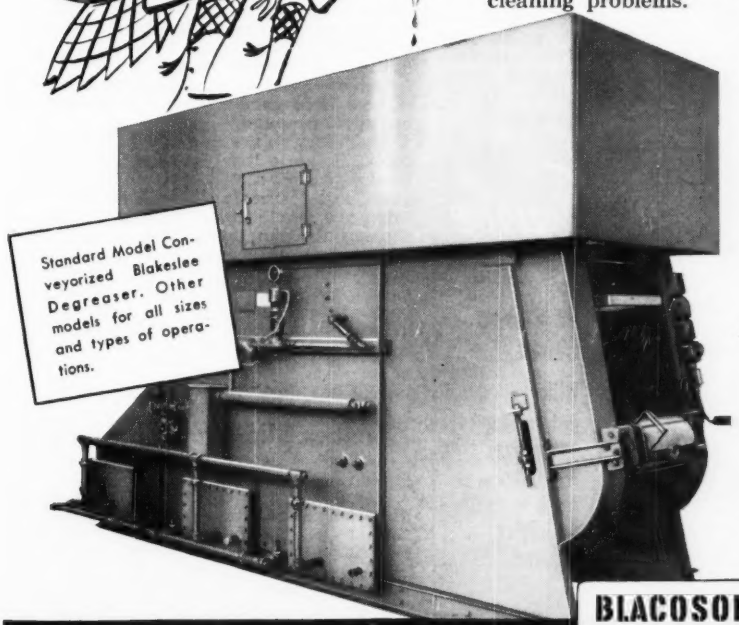
Established 1896

BLAKESLEE
SOLVENT VAPOR DEGREASERS

USE LESS SOLVENT

And that's not all . . . In Blakeslee Solvent Vapor Degreasers, metal parts are rendered chemically clean and dry in just a few seconds. Cracks and spot welded seams come out 100% grease-free. This means savings in time, labor and rejects.

Blakeslee, pioneer in mass production cleaning methods, is the logical source to answer your cleaning problems.



Standard Model Conveyorized Blakeslee Degreaser. Other models for all sizes and types of operations.

G. S. BLAKESLEE & CO.

BLACOSOLV DEGREASERS AND SOLVENT

NIAGARA METAL PARTS WASHERS

G. S. BLAKESLEE CO., CHICAGO 50, ILLINOIS
NEW YORK, N. Y. TORONTO, ONT.

erties that endowed it with great potential industrial value—outstanding heat and chemical resistance—made it difficult to work into readily usable forms.

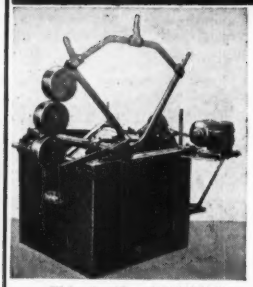
It has now been discovered that the material could be made as a suspensoid containing up to 65 per cent of solids. In this form the particles are so fine that they remain suspended in the carrying liquid for considerable periods of time with little or no settling, it is stated.

There are three types of Teflon spray coatings, primer, intermediate, and finish. The process for applying each is similar. Before spraying the primer, it is necessary to clean the metal surface, washing off grease with a solvent, and, preferably, sandblasting to ensure the best possible adhesion. After spraying, the coating is air or force-dried at temperatures below 200 deg. F. The metal is then heated, either by baking in an oven or by spotheating, until the temperature is brought to around 750 deg. F. At this point, the tiny particles of solid Teflon turn to jelly and fuse together, giving a continuous film. As the metal cools, the film becomes solid. If thin spots are found, or damage occurs after use, the finish can be patched by cleaning down to the metal, applying more spray finish, and fusing with blow torch or gas flame. Repairs can be made in 15 to 20 minutes, it is claimed.

According to Du Pont, the resin finishes will adhere to many metals, such as steel, stainless steel, aluminum, brass, copper, and to glass (after sandblasting), porcelain, and brick. In general, four to six coats will suffice for corrosion protection, a primer about three-tenths of a mil thick and intermediate and finish coats of a mil each. Against the more corrosive chemicals, a greater margin of safety can be obtained by building up a heavier film.

Field tests are being made of the material in electroplating tanks and on racks.

At your Service



for PLATING BARRELS

With Outstanding Advantages And Most Satisfying Results!

This is the DANIELS 4 OLS Plating Barrel for production plating of small parts in bulk.

Contact: *Details on request.*

DANIELS PLATING BARREL & SUPPLY CO.

DANIELS MANUFACTURERS & DISTRIBUTORS Electroplating and Polishing Equipment and Supplies

129 Oliver Street, Newark 5, N. J.
Telephone MArket 3-7450

Gra-Lite Chemical Resistant Fabric

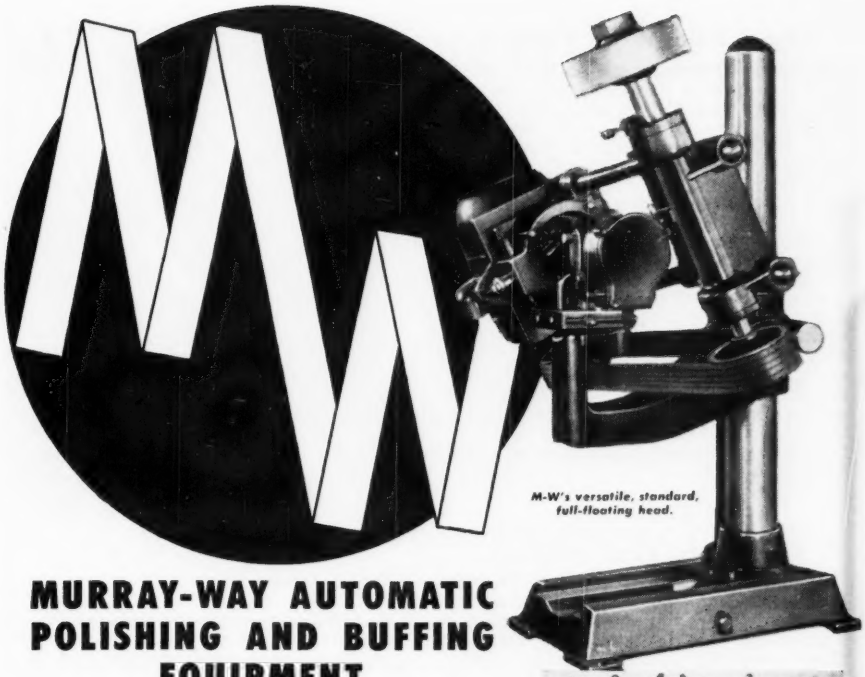
Gra-Lite Fabric, developed by the Standard Safety Equipment Co., 232 W. Ontario St., Chicago 10, Ill., provides resistance to a wide range of chemical hazards, including, with special preparation of the compound, resistance to anhydrous hydrogen fluoride. With Gra-Lite compound, it is possible to completely seal over garment seams and prevent chemical seepage.

According to the manufacturer, the material is very light in weight, will not bind or cling, and is extremely flexible; even under freezing temperatures it retains its flexibility. Gra-Lite compound thoroughly penetrates the fibers of the base fabric, thus making it highly abrasion-resistant and able to withstand harsh cleaning agents. It will not mildew or rot, it is stated, and complete impregnation also provides chemical resistance on the inner surface of the material.

Gelber Miniature Centrifugal Pump

A miniature electric centrifugal immersion pump, developed by Samuel S. Gelber Co., 162 N. Clinton St., Chicago 6, Ill., has an overall height of less than 3 inches and weighs only 16 ounces. The fleapower motor is specially treated to withstand moisture.

The pump, which is said to have only one moving assembly, no metal to metal contact, no bearings to wear, and no packing to leak, gives 44 g.p.h. at free discharge, 30 g.p.h. at 12 inches, and shuts off at 20 inches. It is available in 110 volts, 60 cycles, single phase only.



M-W's versatile, standard, full-floating head.

MURRAY-WAY AUTOMATIC POLISHING AND BUFFING EQUIPMENT

Preferred by experienced plant men throughout the country. A complete line of standard or special-built equipment to fill any need.

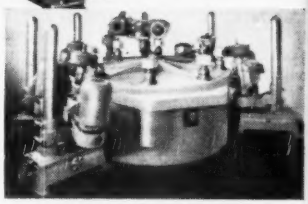
STANDARD . . . full-floating pedestal type heads to combine with continuous or indexing rotaries; or with straight-in-line or semi-automatic machines. Sizes to fit your requirements.

SPECIAL . . . equipment designed and built to your exact requirements, by our thoroughly experienced engineering staff. We serve the country's finest manufacturing plants.

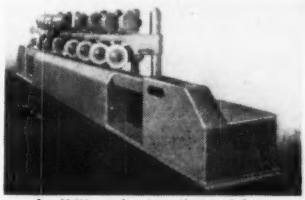
MAJOR IMPROVEMENTS PIONEERED BY MURRAY-WAY

● **Full-floating head.** Assures uniform working pressure . ● **Adjustable fulcrum.** Permits adjustment in compound angles . ● **Variable, selective dwell.** Two seconds to two minutes . ● **Automatic belt contour-finishing** . ● **Micro Polish process**—prepolishing before forming . ● **Ventilated buffing wheels.**

Territories open for qualified representatives.



A typical M-W rotary installation—note versatility of compound angle, floating heads.



An M-W semi-automatic, straight-in-line special-built installation.

MURRAY WAY

THE MURRAY-WAY CORPORATION

3925 WEST FORT STREET • DETROIT 16, MICHIGAN

AUTOMATIC POLISHING, BUFFING, GRINDING EQUIPMENT

Quick Bake White Finishes

A series of quick bake finishes which will cure in 3 to 7 minutes has been developed by The Watson-Standard Co., 225 Galveston Ave., Pittsburgh 30, Pa. These new litho systems include sizes, base whites, and wet print finishing varnishes for application by the roller-coating method. Baking cycles of 3 to 7 minutes may be used with results equalling conventional baking cycles of 10 to 30 minutes, it is claimed.

Outstanding features of the coatings are that they will cure properly in quick bake cycles and may be adapted to conventional longer cycles without discoloration. Standard thinners of the high flash or mineral spirits type may be used. According to the manufacturer, the coatings possess excellent adhesion, good fabrication properties (including low temperature fabrication), depth tumbling resistance, and flow.

Concentric Dial Indicator

Announcement has been made by Taylor Instrument Companies, 95 Ames St., Rochester 1, N. Y., of a Concentric or Full-Circle Dial Indicator for transmitting, receiving and controlling instruments.

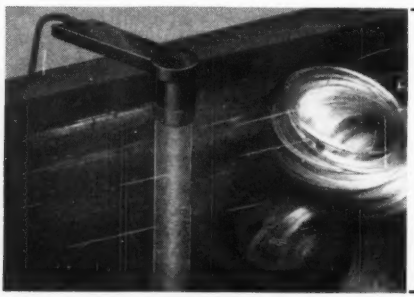
The Indicator has a unique dial construction which makes instrument mechanism easily accessible for inspection or adjustment by simple rotation of the dial, the manufacturer states. Large pointer with 270 degree sweep together with white numerals on a black background stand out effectively so that they can be read from a distance of 50 to 100 feet.

The instrument may be used with only low pressure unit or mercury manometer actuation for differential or absolute pressure applications. It is available as a simple indicator, indicating receiver, indicating controller, indicating transmitter, indicating transmitter controller, or indicating receiving controller. Standard ranges are 0 to 10 on square root scale and 0 to 100 and 0 to 200 on uniform scales.

Concentric Dial Indicator

Tuck No. 330 Vinelectric Tape

Backed with synthetic resin used on Type "T" synthetic insulation wire, Tuck No. 330 Vinelectric Tape, product of the Technical Tape Corp., New York 53, N. Y., is said to provide complete electrical and mechanical protection, doing the work of both insulating and friction tape.



ELECTRIC IMMERSION HEATER FOR CORROSIVE SOLUTIONS

The Amersil Heater consists of an outside shell of corrosion resistant fused quartz, containing a heating element of nichrome wire. Available in a variety of shapes and sizes.

Write for complete details.

AMERSIL COMPANY INC.
900 PASSAIC AVE. EAST NEWARK, N. J.

HEATBATH CORPORATION

announces

● The new Controlled Oxidation Pentrate for rapid, economical black oxide finishing of steel.

A new method and product that is 25 to 50% faster in action and lower in cost compared to other products in use today.

The new Pentrate is unique, fool-proof, and easy to operate.

Steel parts are finished a dense jet black in solutions that are under control at all times and operate at peak efficiency.

A BRAND NEW PRODUCT!

Easy, Rapid, Lower Costs

The new Pentrate is a development resulting from 25 years experience in black oxide finishing.

Heatbath Corporation has produced more black oxide finishing products since 1925 than all other makes combined.

Write for Data Sheets describing the new Controlled Oxidation Pentrate.

HEATBATH CORPORATION
SPRINGFIELD 1, MASS.
In Canada: Wm. J. Michaud Co., Ltd.
Montreal, Quebec.

Fill in Coupon and Mail today!

HEATBATH CORPORATION
Springfield 1, *Mass.* F-1

Please send me new data sheets on Controlled Oxidation Pentrate.

*Name*_____

*Position*_____

*Firm*_____

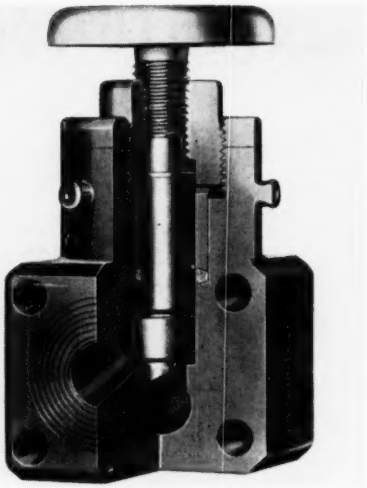
*Address*_____

Easy and quick to apply since there is no liner to strip out, Tuck No. 330 resists oils, acids, alcohol, alkalies, and water. The manufacturer further claims that it has excellent outdoor aging properties.

"Karbate" Brand Corrosion-Resistant Globe Valve

The newly designed "Karbate" Brand Impervious Graphite Globe Valve has been announced by National Carbon Division, Union Carbide and Carbon Corp., 30 East 42nd St., New York 17, N. Y. The valve, in 1 and 2-inch sizes, is designed for shut-off and throttling service with corrosive fluids free from abrasive solids. Except for the Teflon packing, all valve parts in contact with the fluid are Karbate Imprevious Graphite, thus preventing corrosion and contamination and practically eliminating replacement and maintenance expenses.

Outstanding features claimed for the valve are its resistance to practically all corrosive chemicals, including hydrochloric acid, dilute sulfuric and hydrofluoric acids and chlorinated organic compounds, and its resistance to thermal shock. Because of the excellent thermal conductivity of impervious graphite, the valve may be readily heated from a steam coil of copper tubing wrapped around it, when heating is required for handling highly viscous or saturated solutions.



"Karbate" Brand Corrosion-Resistant Globe Valve

The tapered disc valve seat assures accurate and close control of fluid flow, and it is self-reseating. The valve is light and small, has short face-to-face dimensions, and is self-lubricating. Sturdy and compact construction ensure long life, trouble free operation and ease of installation, it it stated.

TWENTY-SEVEN YEARS OF QUALITY

4A

BUFFING *and* POLISHING COMPOUNDS

for all types of metals

CUTTING, CUT AND COLOR, AND MIRROR-FINISHING COMPOUNDS

EASY WASH

in cake and dip form

QUALITY — PRICE — SERVICE

HARRISON & COMPANY, INC.

Haverhill, Massachusetts

Portable Small-Lot Plating Barrel

A small portable plating barrel for use in still plating tanks or special tanks in plating small odd lots has been announced by the Belke Manufacturing Co., 941-53 N. Cicero Ave., Chicago 51, Ill. Called Porto-Plater, the unit is said to be excellent for plating jewelry, odd lot production laboratory work, test runs and similar works. It is made of high temperature Lucite and withstands all cleaning cycles and gold, silver, rhodium, cadmium, copper, nickel, zinc, tin and brass plating cycles at temperatures to 185 deg. F. A self-contained motor drive with plug connection makes the plating barrel easy to transfer.

in BURNISHING MATERIALS

it's the shape that counts!

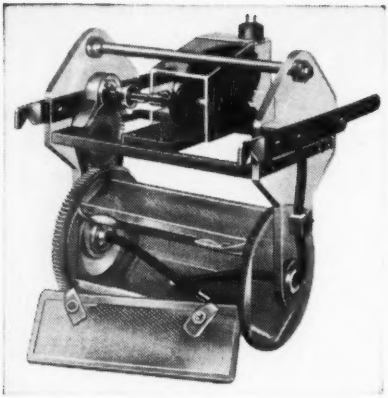
When your product design requires a burnishing material which reaches into hard-to-clean corners . . . use Abbott Burnishing Diagonals. They're shaped to do the job right!

Abbott Burnishing Materials are available in five shapes . . . Ball, Ovalball, Cone, Diagonal, Pin . . . scientifically designed to make effective contact on any size and shape of metal stamping or casting. Each is a burnishing tool made from high quality, Abbott bearing ball steel, deep hardened and polished to a mirrorlike glass-hard finish. For the better results you must have to meet today's cost requirements . . . use Abbott!

Some parts require a special mixture of Abbott Burnishing Materials. Send for catalog showing sizes, shapes, uses. No obligation.

THE ABBOTT BALL COMPANY
1064 New Britain Ave.,
Hartford 10, Conn.

ABBOTT
the all round ball



Portable Small-Lot Plating Barrel

When used in still plating tanks, the support arms of the unit rest across the bus rods permitting the cylinder to hang down into the solution. The contact ends of the support arms are notched for the cathode rod to assure electrical contact and to hold the unit in position. Porto-Platers may also be used in special small tanks.

Iridite Alcote

Iridite Alcote, a chromate type, corrosion resistant finish for aluminum, has been announced by Allied Research Products, Inc., Baltimore, Maryland.

Like the Iridite finishes for zinc and cadmium, Iridite Alcote is applied to parts by a simple, non-electrolytic dip with the solution operating at room temperature. No fumes are given off during processing and consequently no exhaust systems are required. The coating ranges in color from clear to light bronze and may be obtained from as short an immersion as 10 seconds. For greatest color intensity and optimum corrosion resistance, the immersion time should be set at 2 minutes, the manufacturer states.

Salt spray tests indicate resistance to corrosion for as long as 1000 hours on wrought stock and 250 hours for castings, depending upon alloy and treating time. Tests to determine the paint base characteristics of the coating indicate that Iridite Alcote provides excellent adherence for the paint to the metal.

In addition to its corrosion-resistant properties it is claimed that Iridite Alcote coating is highly resistant to abrasion. Treated parts may be buffed, mechanically and roughly handled or formed without materially affecting the coating.

No special equipment is needed for the application of Iridite Alcote, nor is special training required for operating personnel.

Skin Cream

Tarbonis Cream for combating the many forms of occupational skin irritations is now being marketed by The Tarbonis Co., 4300 Euclid Ave., Cleveland 3, Ohio. The cream is recommended for skin irritations due to cutting oils, coolants, abrasives, solvents, acids, alkalies, chemicals, and so on.

Tarbonis includes a vanishing cream vehicle which is rubbed into the pores of the skin and is said to quickly alleviate the discomfort of irritations. Neat and clean, the cream can be applied on the job without interference with the employee's work.

Enclosed Instrument Panels

Compact, totally enclosed panels designed for laboratory or shop use have been marketed by the Claud S. Gordon

Enclosed Instrument Panel with a pyrometer controller and the Xactline "Straight Line" Control in place

WE OFFER
20 YEARS EXPERIENCE
BULK CHROMIUM PLATING
Screws, Rivets, Bolts, Nuts, Washers, Eyelets,
Small Stampings, Shells, Turnings, Wire Items, etc.
All Machine Screws Gage checked and Plated to Gage Fit.
HIGH LUSTER
ROLLED OR BUFFED FINISHES
Automatic Buffing of Screws, Shells, Caps.
ALL PLATING INSPECTED
Rejects refinished and work returned complete.
Will stand Crimping and Bending.
Plating controlled to Dimensional Tolerances.
SPECIFICATION PLATING
Plating thickness and Corrosion Resistance assured by
Magna-Gage and Microscopic Thickness Tests and Salt Spray.
Complete Laboratory Control.
The CHROMIUM PROCESS Company
SHELTON, CONNECTICUT
Assistance gladly rendered on Dimensional Allowances or other
Plating Problems. No Obligation. Samples plated without charge.

Co., 3000 S. Wallace St., Chicago 16, Ill. Complete with pilot light and push-button station, they are wired and ready for connecting power and thermocouple leads to terminals in the panel.

Suitable for bench use or for wall or floor mounting on angle brackets, the panels are constructed of 16-gauge steel finished in black enamel and are available in two sizes: 19 x 15 x 7 inches deep and 21 x 21 x 9 inches deep.

Desk Magnalite

To speed up inspection and assembly of small parts, a visual aid, the Desk Magnalite, is being marketed by the Haas Corp., 106 E. Main St., Mendon, Michigan. The tool consists of a large 5-inch lens set in a plastic head with two fluorescent lights built in on the underside. Flexible arm mountings permit instant adjustment and leave both hands free.

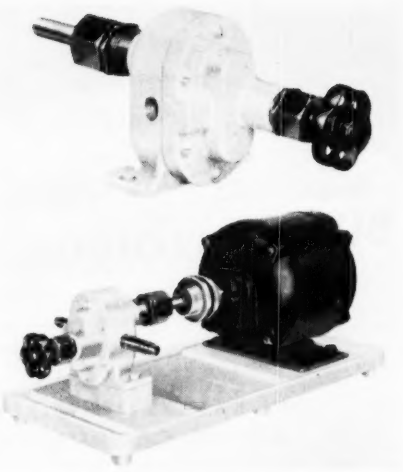
The Magnalite is manufactured in three styles of mountings, the H-25 Desk Model, the H-50 Universal Clamp Model, and the H-100 Pedestal Model. In addition, special mounts can be made to specifications.

Stainless Steel Self-Priming Pump

Ertel Engineering Corp., 22 Front St., Kingston, N. Y., has added a new stainless steel self-priming pump to its line of liquid handling equipment.

Designated as Model ESP, the unit is available in five sizes rated at 3, 5, 10, 20, and 30 g.p.m. at zero pounds pressure. The design is extremely compact and ensures perfect alignment of the minimum of moving parts, and continuous maintenance of pumping capacity, it is stated.

Handy manual by-pass control valves



Stainless Steel Self-Priming Pump

are included on each pump to easily regulate pressure and flow rate. All sizes are available as individual units or as complete pump assemblies, direct drive or belt driven.

Prozite Buffing and Polishing Compositions

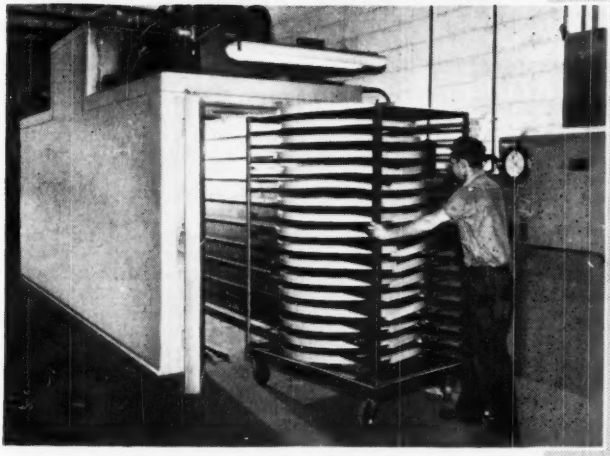
Compounded with new bases and lubricants, together with an abrasive material said to have the characteristics of fine grain size and excellent cutting qualities, a new line of buffing and polishing compositions, designated as Prozite Compositions, has been developed. Advantages claimed for the products by the manufacturer include improved performance, more mileage, exceptional ease of cleaning, and brighter color of finish.

Three major companies have pooled resources to develop, manufacture, test, and distribute Prozite Buffing and Polishing Compositions. Research and development work on Prozite products was performed by Poor & Co., Waukegan, Ill. Manufacturing of the products is being carried out by Calumet and Hecla Consolidated Copper Co., Calumet, Mich., where gigantic bulk material handling and processing facilities are available. Gerity-Michigan Corp., Adrian, Mich., has been designated as the exclusive national sales agent for Prozite Compositions. All Prozite products are shop tested in this plant, which is one of the largest metal polishing and

PAINT MIXER

MIRACLE
5 GALLON
PAINT REJUVENATOR
All paint restored to original consistency without opening the can.
2 minutes per gallon.
MIRACLE PAINT REJUVENATOR CO.
128 E. 10th St., St. Paul 1

Even heat...



top to bottom

. . . at Daystrom Corp. Olean, New York

"Tricky" Color Match Assured by Uniform Temperature in KIRK & BLUM Industrial Oven

To assure uniform color on enamel-finished metal trim for plastic table tops, this manufacturer relys on a KIRK & BLUM Oven. Lack of color uniformity on metal trim would ruin attractive appearance of tables.

Compactly designed and fully equipped with safety and temperature controls, the oven has enclosed ducts which direct "horizontal flow" recirculation to assure perfect uniformity of temperature. Almost 5000 pieces of trim are baked per day in 15 minute cycles.

Whatever your needs in ovens for drying, dehydrating and baking, consult KIRK & BLUM. For further details, ask for bulletin on "Industrial Ovens."

KIRK AND BLUM

INDUSTRIAL OVENS

The Kirk & Blum Mfg. Co.,
2816 Spring Grove Ave.,
Cincinnati 25, Ohio

plating organizations in the country.

The line of Prozite products includes Prozite Buffing and Polishing Compositions in bar or liquid form, Pro-Brite Lime Finishes, and Pro-Lube Lubricants for abrasive belts and wheels.

Inquiries concerning Prozite products should be addressed to The Prozite Division, Gerity-Michigan Corp., Adrian, Michigan.

PRODUCT LITERATURE

The publications listed in this section may be obtained free upon written request on company letterhead to the manufacturers concerned. Your courtesy in mentioning PRODUCTS FINISHING when requesting copies of these publications will be sincerely appreciated by the manufacturer and the publisher of this magazine.

H-VW-M Tank Rheostats. Bulletin No. TRA-526 providing complete details on its tank rheostats can be obtained from the Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

Baking and Drying Ovens, both batch and conveyor types, for processing, varnish baking, paint and lacquer drying, lithographing and decorating, are the subject of Bulletin 5 prepared by the Young Brothers Co., 1837 Columbus Rd., Cleveland, Ohio.

Durco Corrosion Resisting Fans. The Duriron Co., Inc., Dayton 1, Ohio, has issued Bulletin 1103 describing its line of fans for long-life service handling of corrosive fumes. Illustrated by photographs and line drawings are construction details, typical applications, and accessory equipment.

GOLD PLATING SOLUTIONS

In All Colors

Guaranteed 100% Pure Gold Content
Troy Weight - Color Constant
Tarnish Resistant

Proven Quality by the Acid Test

Write or call our experts about your plating problems

Davis-K-Products Co.

54 West 22nd St., New York 10, N. Y.
Oregon 5-0094
5-0095

Dixrip Fine Wire Scratch Brushes for all industrial purposes are described and illustrated in a catalog and price list available from Dixon & Rippel, Inc., Dept. P, Kingston, New York.

Diversey Pre-treatment of Aluminum for Spot Welding. This process is described in detail, and its outstanding characteristics discussed, in a 12-page manual in file-folder style, prepared by The Diversey Corp., 53 W. Jackson Blvd., Chicago 4, Ill. The manual contains many pictures, charts, and graphs, in addition to several case histories.

"Everything in Safety" is the title of its 46-page 1950 catalog of personal protective equipment and industrial safety devices, released by the General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia 32, Pa. Fully illustrated and including a price list, the catalog covers respiratory devices, eye protection, hats, gloves, carboy pumps, drum pumps, and miscellaneous industrial safety equipment.

Engineering and Production Equipment. Continental Industrial Engineers, Inc., 176 W. Adams St., Chicago 3, Ill., has prepared Booklet No. 127 describing in detail the broad scope of its services to industry. Included are many descriptions and illustrations of a wide variety of production lines and automatic processing equipment for metal coating, bright annealing, and organic finish drying.

Vinylite Vinyl Butyral Resins are discussed in **Technical Release No. 11,** a 24-page booklet prepared by the Bakelite Corp., Division of Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y., to enable manufacturers to immediately utilize Vinylite vinyl butyral resins in the preparation of coatings and adhesives. Properties of the resins are discussed, and some of the applications for the products, including their use as a safety glass and metal bonding material and in protective coatings, are described. Formulations of several of the products are listed, together with charts and tables containing additional data on many of the products in this group.

How Production-Wise Manufacturers

SAVE SANDING COSTS

FINISHING METAL

This manufacturer of automatic dishwashers, dissatisfied with other abrasives, switched to AP's No. 80 Jewelox Cloth X73. Now reports: "This cloth is the best we've ever used!"

FINISHING PLASTICS

This manufacturer called in AP Engineers on problem of finishing plastic switch plates. Cool-running AP Silver Streak Belts were recommended. Result: Silver Streaks did 25% more work than other belts — eliminated spoilage — cost not a penny more.

Have *you* got a finishing problem? Ask your distributor about AP Jewel Coated Abrasives or write us today!

Abrasive Products, Inc.

SOUTH BRAINTREE 85, MASSACHUSETTS — MAKERS OF JEWEL COATED ABRASIVES

ABRASIVE PRODUCTS, INC. JEWEL ABRASIVES SOUTH BRAINTREE, MASS. U.S.A.

There's a JEWEL ABRASIVE for Every Polishing and Finishing Need

BELTS

DISKS

SHEETS

SPECIAL SHAPES

Cloth, Paper, Fibre or Combination Backing

BUY THROUGH YOUR INDUSTRIAL DISTRIBUTOR

"Ahcoloid Emulsion Cleaner" is the title of a booklet supplied by the Apothecaries Hall Co., Waterbury 88, Conn., which explains in detail the properties and operation of this new cleansing agent.

Moco Compounds. The Mosher Co., 15 Exchange St., Chicopee, Mass., has available a four-page pocket-size guide for purchasers of buffing and polishing compounds.

Suggested uses for many Moco compounds are outlined, and other products and services available from the company are listed.

"Everyboy Uses Felt" is the title of a 20-page bulletin prepared by Niran Bates Pope, secretary of the Standardization Committee. Available from The Felt Association, 74 Trinity Place, New York 6, N. Y., the booklet is a general description of the origin, structure, evolution, utilization, technology, and potentials of felt, which is a natural derivative of wool.

"Hisey" Electric Grinders and Buffers. The Hisey-Wolf Machine Co., Cincinnati 8, Ohio, has published Catalog No. 71 which contains data on its complete line of electric grinders and buffers. Specifications and illustrations of the various machines are included in the 36-page, two-color catalog.

Xim Flash Bond, a synthetic liquid used as a primer for aluminum, galvanized iron, steel, and other metal surfaces to ensure adhesion of subsequent finish or color coats, is fully covered in literature released by the H. Forsberg Co., 5103 Lakeside Ave., Cleveland 14, Ohio.

Amplex Industrial Infra-Red Heat Lamps are the subject of a catalog page issued by Amplex Corp., 111 Water St., Brooklyn 1, N. Y. Complete specifications are provided, and industrial uses of the products are outlined.

Burnishing Materials. The Abbott Ball Co., 1064 New Britain Ave., Hartford 10, Conn., has prepared data, charts, and so on, illustrating and describing its line of burnishing materials.

NOW!

ORDER THE NEW
MORSE DRUM PLUG WRENCH

Instantly loosens or tightens 95% of all plugs or bungs in steel drums. Extra strong 16" steel tubing handle gives more leverage. Saves time, labor. Cuts down on accidents.

GUARANTEED!
Wgt. Only 2 Lbs.
ONLY $2.60
Non-Sparking Type, $4.00
(Plus parcel post)

Send order to MORSE MFG. CO., INC.
125 Dickerson Street **Syracuse 2, N. Y.**

Controlled Oxidation Pentrate. Data sheets describing this process for rapid black oxide finishing of steel can be obtained from the Heatbath Corp., Springfield 1, Massachusetts.

"The Facts About the Miracle Paint Rejuvenator" is the title of a four-page booklet issued by the Miracle Paint Rejuvenator Co., Inc., 128 E. 10th St., St. Paul, Minn. Complete construction data, together with illustrations and descriptions of the various models available, are presented.

"Surprep," a phosphating-type cleaner for rapid removal of rust, oil, and grease from large objects, is described and illustrated in a bulletin issued by Enthone, Inc., Dept. PF, 442 Elm St., New Haven, Connecticut.

Skin Cream. A four-page pocket-size folder descriptive of Tarbonis Cream for the relief of occupational skin irritations is now available from the Tarbonis Company, 4300 Euclid Ave., Cleveland 3, Ohio.

Lectrocop Plating Anode. Complete data covering its Lectrocop Plating Anode are contained in a bulletin distributed by Wagner Bros., Inc., 432 Midland, Detroit 3, Michigan.

Triangle Infra-Red Ovens. Applications and advantages of Triangle Infra-Red Ovens are cited and illustrated in an eight-page catalog issued by the Triangle Equipment Co., Inc., 45 River Rd., Nutley, N. J. Also included are data on the company's designing and engineering service.

Durco Bulletin 1603A. Complete details on Durco Heat Exchangers for plating applications are contained in Bulletin 1603A issued by The Duriron Co., Dayton 1, Ohio.

For a real good polishing job use

Keystone TURKISH Emery

FRESH SUPPLY AVAILABLE

KEYSTONE EMERY MILLS *Write for Sample* **4316 Paul St., Phila., Pa.**

Therm-O-Spray, a simple and effective attachment for hot spray painting, is fully described and illustrated in Folder SPC-1 issued by Douglas Wilson & Co., Inc., 101 Park Ave., New York 17, New York.

Nylon Anode Bags. Enthone, Inc., Dept. PF, 442 Elm St., New Haven, Conn., has prepared a bulletin on its Nylon Anode Bags, which are made to specifications, for nickel, copper, silver, and other plating solutions.

Homogeneous Lead Covered Copper Coils. A four-page folder prepared by Knapp Mills, Inc., 121 Broad St., New York 4, N. Y., presents a great deal of precise technical information, including full data on the formulas for calculating the heat transfer of homogeneous lead covered copper tubing.

Oil and Water Extractor Bulletin. Full information regarding Binks oil and water extractors, used to purify compressed air before it reaches the spray gun, is contained in a bulletin available from Binks Manufacturing Co., 3118-40 Carroll Ave., Chicago 12, Ill. Prices of the products are listed in the bulletin.

Stevens Catalog No. 27. Materials and methods for polishing, buffing, and descaling operations, together with helpful production hints, are described and illustrated in this catalog prepared by Frederic B. Stevens, Inc., Detroit 16, Michigan.

Dust Collectors. Rapid selection of correct size unit type dust collectors for any industrial dust problem requiring from 200 c.f.m. to 3,600 c.f.m. is given in Bulletin 610 just issued by Aget-Detroit Company, Ann Arbor, Michigan.

Among tabulated comparison of all units in the line are general recommendations of typical wheel sizes that any single unit will handle.

Also given is an exact method for determining the correct amount of air suction required at any wheel in accordance with New York State Code requirements.

Engineering Publications. The International Nickel Co., Inc., 67 Wall St., New York 5, N. Y., has published **List "A"** of helpful publications for production men, design engineers, metallurgists, and metal users on nickel alloy steels, stainless steels, nickel cast irons, nickel brasses and bronze, and nickel plating. A brief outline of each of its publications is provided.

Lyfanite Brochure 4998. A brochure outlining the process for producing Lyfanite, a corrosion resistant coating for aluminum alloys, is being offered by Neilson Chemical Co., 6561 Benson St., Detroit 7, Michigan.

Appli-matic Bulletin. A bulletin describing the operation of Vander Wal-Wagner Appli-matics, mechanical buffing compound applicators, is available from Wagner Bros., Inc., 432 Midland, Detroit 3, Mich. Use of the Appli-matics in manual and automatic polishing and buffing setups, as well as advantages of the units, is detailed in the bulletin.

McKeon's

Zinc-Brite

added to your zinc plating solution will:

1. **Precipitate heavy metal impurities.**
2. **Increase the life of your brightener.**
3. **Improve the luster of your deposit.**

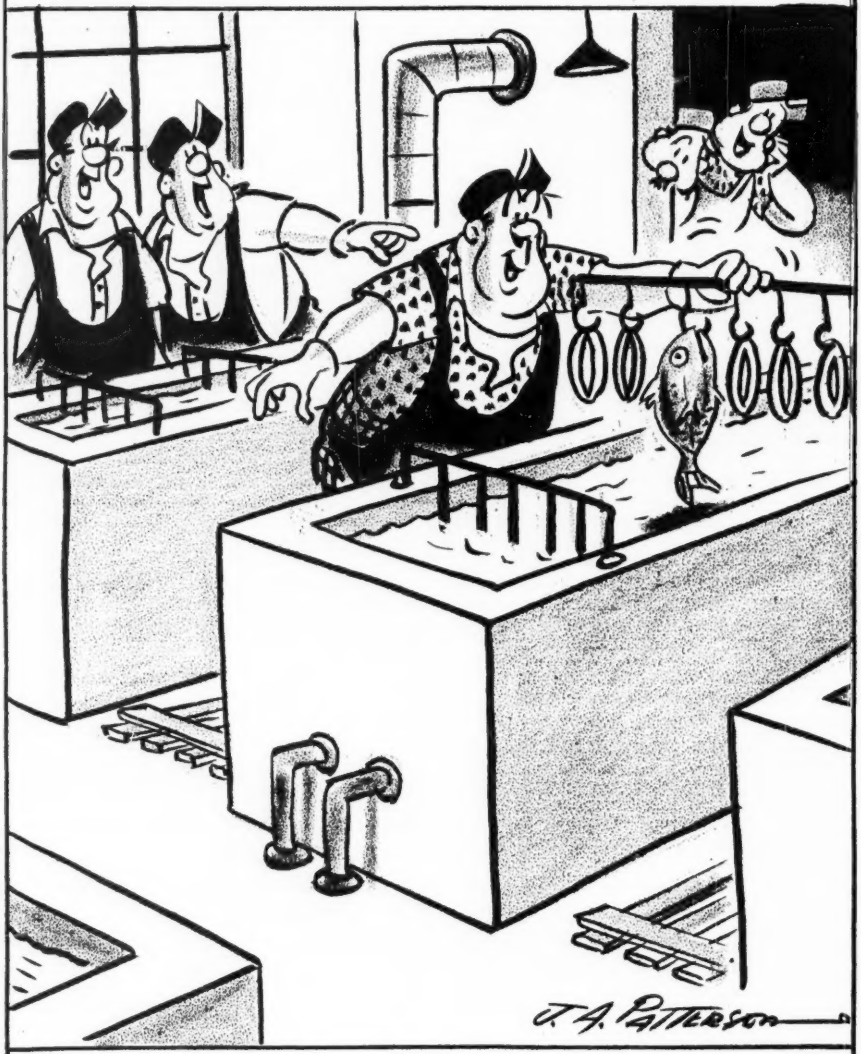
It is compatible with the brightener you are now using.

Order on trial and approval

Sulphur Products Co.

Greensburg 6, Pa.

The Finishing Touch — **By J. A. Patterson**



"Bilgewater thinks his new solution will de-scale anything!"

Opportunity Section

ABRASIVES WANTED

Grinding Wheels — Mounted Wheels — Polishing and Buffing Wheels — Sharpening and Honing Stones — Abrasive Cloth — Abrasive Rolls — Rotary Files — Wire Wheels

SCHUPACK SUPPLY CO.

7331 Cottage Grove Ave., Dept. PF, Chicago 19, Ill.

Phone: ABerdeen 4-4015

INDUSTRIAL FINISHES SALESMAN

This well established lacquer and synthetic finishes manufacturing company is expanding its sales operafions and requires the services of two technically able paint sales engineers with a following. Location within twenty-five miles of Phila. Area to be covered to include N. Y., N. J., New England, and parts of Pa. This is an excellent opportunity well worth investigating. Write in strict confidence with complete information to the American Lacquer Solvents Co., P O. Box 271, Phoenixville, Pa.

PRODUCTS FINISHING Cartoonist J. A. Patterson also fishes, as indicated by the accompanying photograph in which he and Mrs. Patterson can be seen alongside two sailfish caught on a recent trip to Florida.

We have an immediate opening for an experienced paint formulator and chemist (ages 30-45) who is thoroughly familiar with oleic resinous vehicles, drying oils, driers, pigments, paint production and testing, distributing techniques, and a practical application of industrial finishes. Knowledge of new vehicles a definite asset, particularly styrrnated oils. Position involves responsibility from laboratory formulation to factory production. Midwestern. Write Box No. 31, c/o Products Finishing, 431 Main St., Cincinnati 2, Ohio.

WANTED BY LEADING MANUFACTURER ABRASIVE GRAIN DEMONSTRATOR

for field service work requiring travel throughout Ohio and Michigan. Require man thoroughly experienced in all phases of abrasive metal finishing, testing procedures and wheel and belt set-up with cement and glue, preferably one with foremanship experience. Applicant must have imagination, ability to get along with people and willingness to adopt new and improved methods. Write Box No. 32, c/o Products Finishing, 431 Main St., Cincinnati 2, Ohio.

WANTED—
PLATING PLANT MANAGER

To run Bright Nickel and Zinc Plating Plant. Handle solutions, production and maintenance. Write P. O. Box 491, Nashville, Tennessee.

LACQUER THINNER
VINYL THINNER

Available for immediate delivery

American Chemsol Corporation

641 FOURTH AVE. CORAOPLIS, PA.

AGENTS AND JOBBERS

SITUATION OPEN—TOP FLIGHT MANUFACTURING AGENTS AND JOBBERS

Wanted in certain territories to sell Schaffner's Buffing Compositions and Supplies. We specialize in White Finish (Lime Composition), Grease Stick, Tripoli, Emery Cake, etc., in "Bar or Liquid Form." All up to 100% saponifiable. These items can all be made to fit your particular customers' requirements. No account is too small or too large, for our individual attention. SCHAFFNER MANUFACTURING CO., INC., Schaffner Bldg., Pittsburgh 2, Pa.

Catalogs

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Finishing Equipment
"Mahon Industrial Equipment," including Complete Finishing Systems for Enamel; Lacquer; Paint and Varnish; Spray Pickling Equipment; Metal Cleaning and Rust Proofing Equipment; Dry-off Ovens; Filtered Air Supply Systems; Hydro-Filter Spray Booths; Drying and Baking Ovens; Core Ovens; Dust Collecting Systems, is described in a booklet available from R. C. Mahon Company, Detroit 11, Michigan.

2. Solvent Degreasing
A 16-page booklet which emphasizes fundamental practices for the economical use of degreasing solvents in metal cleaning departments of industrial plants has been published by the Detrex Corp., Detroit 32, Michigan.

3. Synthetic Resins
The Hercules Powder Co., Wilmington, Del., has available a 20-page technical booklet which describes the properties and lists the uses of the synthetic resins manufactured by the company.

4. Industrial Enamels
"Pittsburgh Standard Industrial Enamels" is the title of a color card issued by the Pittsburgh Plate Glass Co., Industrial Paint Div., Pittsburgh 22, Pa. The card contains color samples and recommendations for surface preparation and finish application.

5. Electroplating Tape
Physical and chemical properties of "Scotch" electroplating tape, general functions in electroplating, insulation protection, and application procedure for plating racks are contained in a data sheet published by the Minnesota Mining & Manufacturing Co., St. Paul 6, Minn.

6. Tank Heater
"Platecoil," a lightweight embossed plate for tank heating, is discussed as to installation, operation, features, and advantages in a bulletin released by the Kold-Hold Manufacturing Co., Lansing, Michigan.

7. Buffing and Polishing Compounds
A four-page pocket-size guide for purchasers of polishing and buffing compounds is available from the Mosher Co., Chicopee, Massachusetts.

8. Industrial Washing Machines
Factors to be considered in making a proper choice of equipment for thoroughly cleaning metal products are described in a 28-page book published by The Alvey-Ferguson Co., Cincinnati 9, Ohio.

9. Corrosion Resistant Fans
The Duriron Co., Dayton 1, Ohio, is offering Bulletin 1103, describing its line of fans for long-life service handling of corrosive fumes.

10. Reverse Current Cleaners
Oakite Composition No. 90 for anodic or reverse current cleaning of steel is the subject of a 12-page pocket-size folder available from Oakite Products, Inc., New York 6, New York.

11. Buffs
A folder describing in detail the advantages of Jackson Airway Ventilated Buffs is available from the Jackson Buff Corp., Long Island City 1, New York.

12. Dust Control Systems
Young & Bertke Co., Cincinnati, Ohio, has prepared a booklet picturing and describing its method of solving the dust problems created in various industrial plants.

13. Black Finish
Data sheets describing the Controlled Oxidation Pentrate process for black oxide finishing of steel can be obtained from the Heatbath Corp., Springfield 1, Masschusetts.

14. Bright Nickel Plating
Udylite Bright Nickel Plating Process and its advantages are the subject of Bulletin 51, distributed by The Udylite Corp., Detroit 11, Michigan.

15. Synthetic Finish

"Dimenso," a synthetic finish that is designed to provide two colors in one spray operation, is described in a booklet now available from The Sherwin-Williams Co., Cleveland 1, Ohio.

16. Duridizing

A rapid and simple sludge-free phosphatizing process which provides streamlined rustproofing and promotes long paint life, Duridizing is the subject of Technical Service Data Sheet No. 3-2-210, published by the American Chemical Paint Co., Ambler, Pennsylvania.

17. Degreaser Manual

The Optimus Equipment Co., Matawan, N. J., has available a 24-page manual describing and illustrating the design, installation, operations, and maintenance of vapor degreasers.

18. Infra-Red Ovens

How to step up efficiency in drying, baking, preheating, and dehydrating operations with the use of Jensen New Principle "Dual Heat" Infra-Red Ovens is the topic of a four-page catalog released by Jensen Specialities, Inc., Detroit, Michigan.

19. Spray Booths

Catalog 480 describing the Schmieg Centri-Merge Spray Booths for the elimination of paint overspray, with photographs and blueprint reproduction of typical plant installations, can be obtained from Schmieg Industries, Inc., Detroit, Michigan.

20. Cleaners

Parco Cleaners, emulsion and solvent type, acid and alkali type cleaners, are described in a technical publication prepared by the Parker Rust Proof Co., Detroit, Michigan.

21. Corrosion Resistant Coating

A descriptive folder containing specifications and application data on "Rust-Chek", a corrosion resistant product undercoat, is available from the Rinshed-Mason Co., Detroit 10, Michigan.

22. Industrial Ovens

The Kirk & Blum Manufacturing Co., Cincinnati 25, Ohio, has published a descriptive catalog showing installation views of its wide variety of industrial ovens in various types of plants.

23. Silicone-Base Finish

Properties of Mico silicone-base aluminum finish and product applications for the finish are outlined in a folder issued by Midland Industrial Finishes Co., Waukegan, Illinois.

24. Nickel Activator Bulletin

A bulletin describing "Chrometex," a nickel activator used to increase the covering power of chrome, and its application is available from MacDermid Inc., Waterbury 88, Connecticut.

25. Clear Lacquer

The Randolph Products Co., Carlstadt, N. J., has issued a folder which contains helpful, technical, and factual information on clear lacquer.

26. Air Compressors

Bulletin CK-101 providing full details on its 7½, 10, and 15 h.p., 4-cylinder "V" type air compressors can be obtained from The DeVilbiss Co., Toledo, Ohio.

27. Liquid Processing Equipment

Filters, mixers, pumps, tanks, and other standard units developed to meet the varying demands of customers are shown and described in a 24-page catalog prepared by the Alsop Engineering Co., Milldale, Connecticut.

28. Polishing Lathe

The Stevens Mitchell Variable Speed Polishing Lathe is the subject of descriptive literature available from Frederic B. Stevens, Inc., Detroit 16, Michigan.

29. Solvent Vapor Degreasers

Blakeslee Solvent Vapor Degreasers, their operating characteristics, features, and advantages, are explained and illustrated in full detail in a 20-page booklet available from G. S. Blakeslee & Co., Chicago, Illinois.

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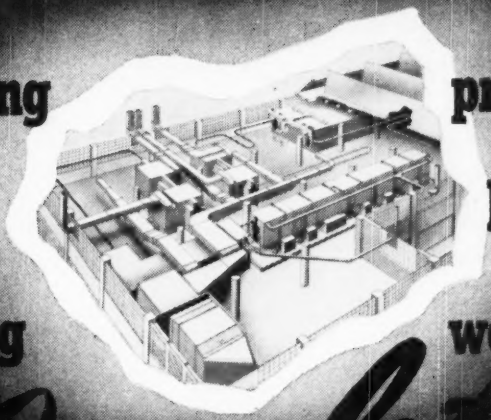

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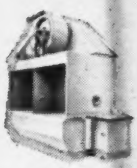

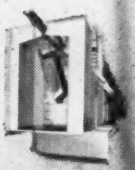

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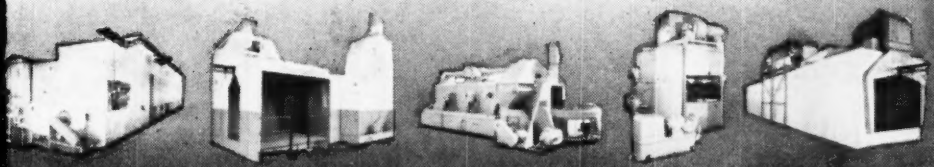

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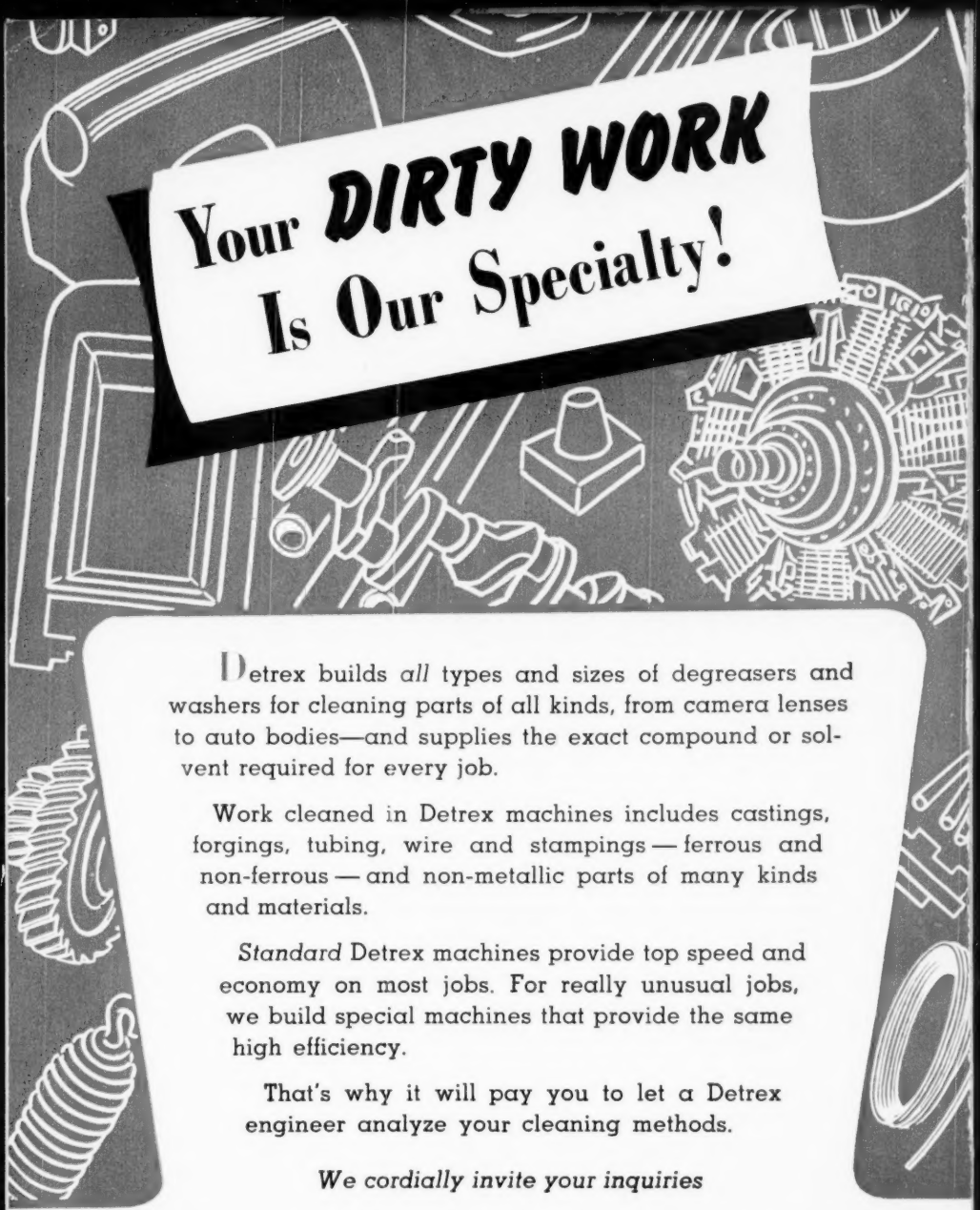

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